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THE PNEUMATIC DYNAMITE GUN.

Our engraving represents the pneumatic gun which, at a recent trial, threw one hundred pounds of explosive gelatine a distance of nearly two miles. It is 60 feet long, has a bore of 8 inches diameter, and is made of one-half inch iron lined with one-sixteenth of an inch of brass. The barrel is supported and stiffened by a light but strong iron frame, at the center of which is a pivot, about which the gun may be revolved, the breech end being provided with wheels that run upon a circular track. The gun is elevated and depressed by means of a piston, whose cylinder receives air from the eight reservoirs placed upon the frame beneath the barrel; this piston presses upon the gun just forward of the trunnions to elevate the barrel; upon the air being allowed to slowly escape, the barrel lowers by gravity. To the pistons of two cylinders located at the pivot are secured the ends of wire ropes, one of which is guided by properly arranged pulleys to the rear part of the frame, where it is fastened; the other rope is fastened to the other side of the frame. The cylinders are operated by compressed air. The gun may be rapidly turned in either direction by admitting air to the proper cylinder.

An arm at the center of one of the trunnions, through which the air passes to the gun, operates an auxiliary valve, which in turn moves the main valve, opening the passage to the chamber behind the projectile.

From the instant of its start the full pressure of the air in the reservoirs is exerted upon the projectile until it reaches the muzzle, when the valves are automatically closed, thereby preventing waste of air. The reservoirs—each of which is 20 feet long, 12 inches outside diameter, and made of iron ½ inch thick—contain enough at 1,000 pounds pressure to discharge the gun six times; but as they can be continually resupplied with air by the compressor, there need be no delay in firing. All the movements of the gun are controlled from the platform at the breech.

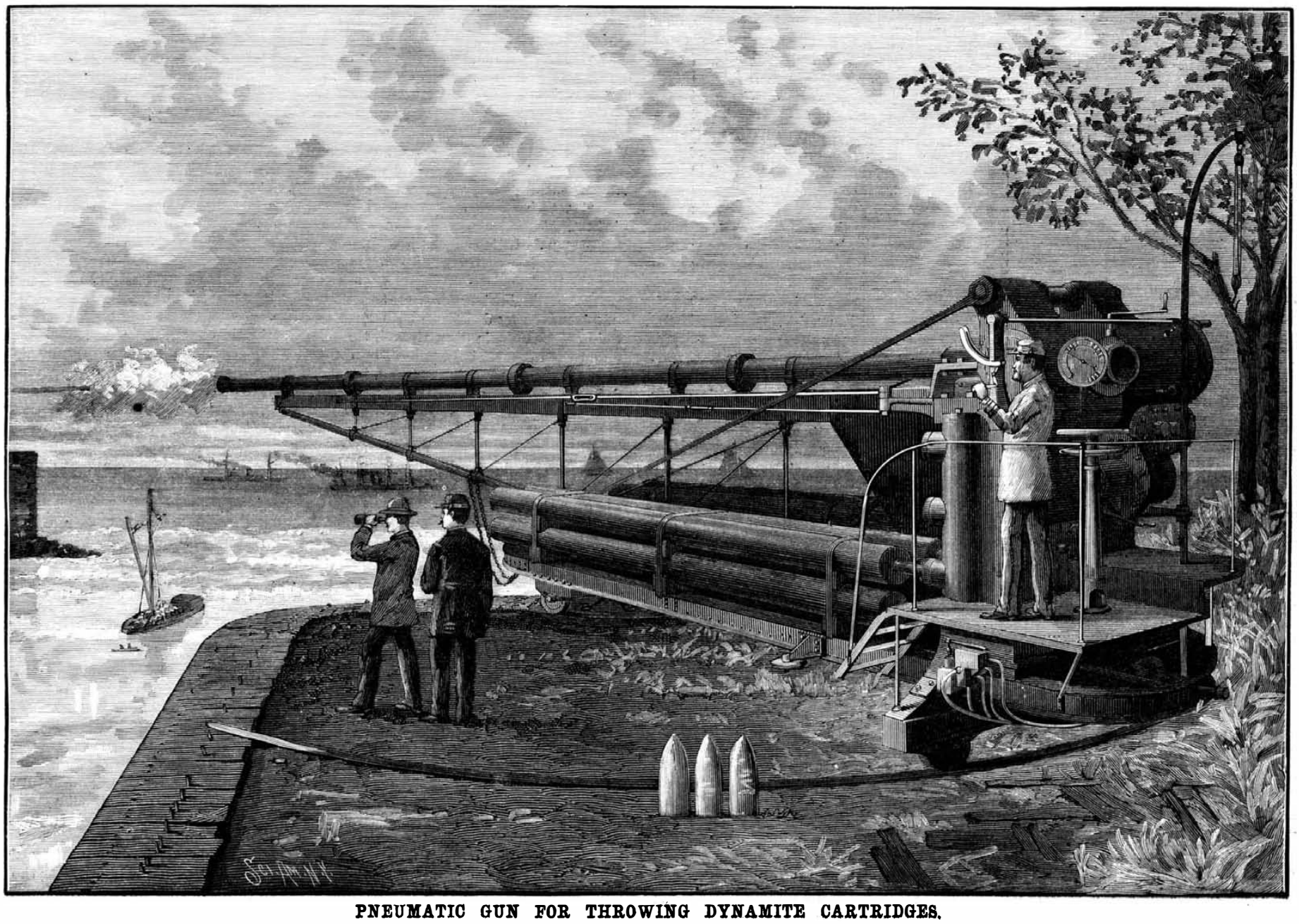
The cartridge consists of two parts; the forward or head portion consists of a brass cylinder 40 inches long, having a conical cap 12 inches long. In the tube are placed 100 pounds of explosive gelatine, through the center of which extends a core of dynamite, and in the center of the dynamite is a fulminate of mercury exploder, from which a rod leads to the point of the cap. This device is for the purpose of exploding the charge by concussion. In order that the charge may be exploded in case of failure of the above device, a dry battery, placed in a little recess in the tail piece of the cartridge, is connected with the fulminate exploder; the battery begins to work upon being brought into contact with water, and the gelatine is exploded. The wooden tail piece of the cartridge is 51 inches long, and guides the projectile in its flight.

Overcoat "Colds."

This is the season most appropriate for a little serious reflection on the subject of overcoats. Nothing seems more simple than to adapt clothing to the weather by the addition of an overcoat, light or heavy, as the occasion requires. It must not, however, be forgotten that just in proportion as the garment superimposed upon the ordinary clothes is effective in producing a sense of warmth, it acts by arresting the evaporation of warm vapor from the body. This warm vapor continues to rise through the ordinary clothing, but it is prevented from escaping, and the clothes are saturated with it. The general effect is well enough while the overcoat is kept on, but the moment it is removed evaporation recommences, and the body is placed in a "cooler" constructed on the principle adopted when a damp cloth is wrapped round a butter dish, the vapor passing off, abstracting the heat, and leaving the contents of the cooler refrigerated.

The point to make clear is that the overcoat, let it be fashioned and ventilated as it may, does not prevent the underclothing from being saturated with moisture, but actually tends to make the moisture accumulate therein. This is proved by the sense of genial warmth felt while the overcoat is worn, and the evidences of perspiration, easily perceived under the arms and at the sides of the chest particularly, immediately after the overcoat has been removed. Moreover, we take off the coat when we enter a warm house, and precisely at the moment when muscular activity is suspended. A very little consideration will suffice to convince the common sense thinker that nothing can well be worse managed than this process, both as regards its nature and the time and conditions of its operation. It is opposed to all the canons of health to allow the clothing to become saturated with perspiration, and then to take off the external covering and suffer rapid cooling by evaporation; while, if it were designed to do this at the worst possible time, probably none worse could be found than when muscular exercise has been discontinued.

The suggestion we have to offer is, that it would be far better policy to wear only one coat at a time, and to make whatever change may be necessary by removing a thin coat and replacing it by a thicker one when going out of doors, and the reverse when coming in. If, instead of wearing overcoats, people would wear coats of different thicknesses, according to the weather and conditions generally, they would avoid the danger of cooling by evaporation; the garments saturated with moisture would be removed, and dry off the body instead of on it. We believe no inconsiderable proportion of the "colds," attacks of lumbago, and even more formidable results of what are popularly called "chills," may be traced to the practice of wearing overcoats which arrest the ordinary process of evaporation, cause the clothing within to be saturated with accumulated perspiration, and are then removed, when rapid cooling takes place. The avoidance of this peril is to be attained by such change of coats as the conditions require.—*Lancet.*



PNEUMATIC GUN FOR THROWING DYNAMITE CARTRIDGES.

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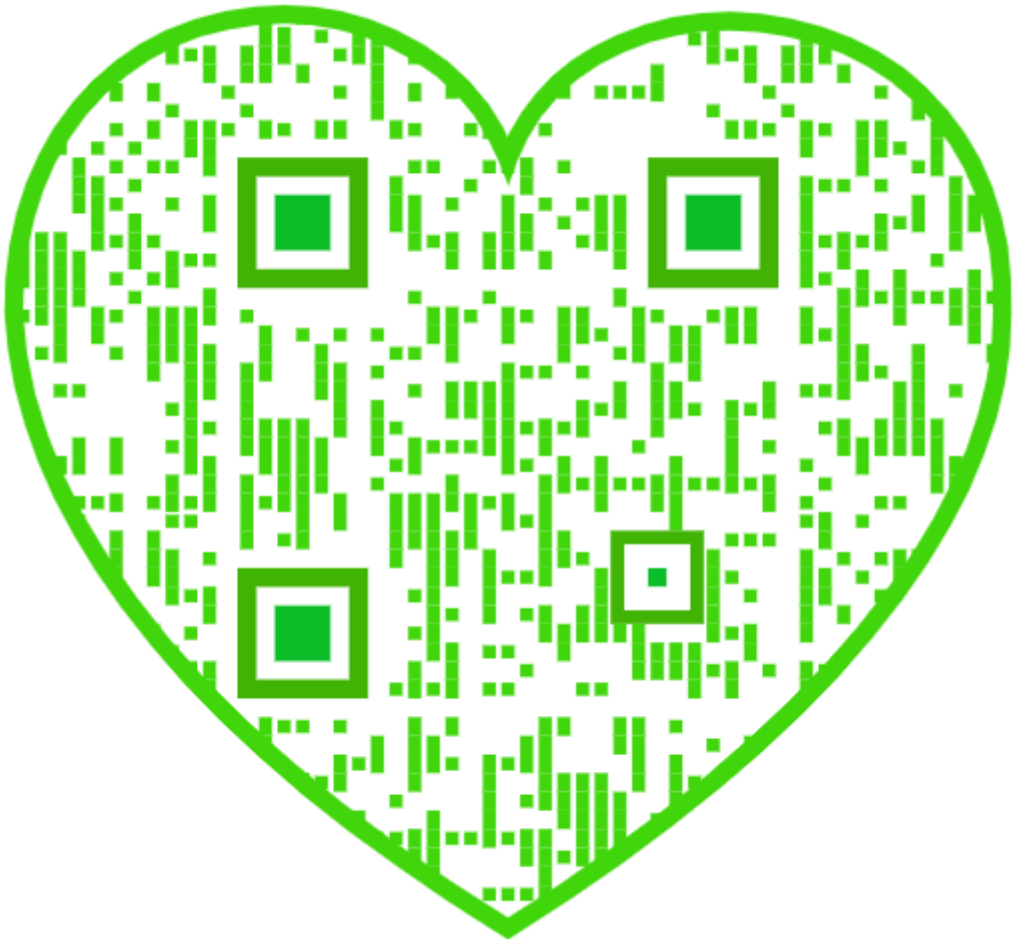

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DECLINE OF AMERICAN SEAMANSHIP.

The recent complaint of an American man-of-war's man that he was compelled to listen to the abuse of his own country while "laying out" on the royal yard, furnishes a curious picture for the contemplative. Nowhere, perhaps, is patriotism of more prime importance than aboard a warship. The crew must swear allegiance to the flag that floats above them, renounce all other allegiance, and be ready at a moment's notice to risk their lives in its defense. To insure anything like a patriotic ardor, a man-of-war's man must be native born. Yet the American warship is manned by foreigners, and it is not strange, therefore, that abuse of the flag should be heard in her tops. The fact is, under the conditions that exist, the American sailor, and his betters, are not to be found on the high seas, cannot be had in the "piping time of peace." He is animated by love of country and of adventure, and attracted by prize money. The dull routine of a warship in times of peace is distasteful to him, and the wages of $21.50 a month much less than the average American sailor can earn ashore. If he wants to go to sea, he can get $30 a month in the merchant service, though usually he has little trouble in getting a mate's berth. But even in this latter position the pay is now insignificant.

And so we have national ships which are American only abaft the mizzen mast; the Swede argues the North Sea fisheries question with the Hollander in the foc'sle, the Magyar combats Austrian unity with the Austrian in the dog watches, and the Irishman quarrels with the Englishman in the tops. No one seems to think of America outside of the wardroom and the cabin. Nor is this condition of things likely to be changed in the immediate future. Those who know the American sailor will incline to the belief that war only—a naval war—can bring him back to the navy, and high wages alone will serve to attract him to the merchant marine.

Native sailors may be said to be much the same as American capitalists and shipping merchants in one respect at least; they engage in what pays them best. The sailor finds that he can make more money ashore than he can at sea, and so he remains ashore; the capitalist gets a higher rate of interest in enterprises on the land, and will not therefore invest in shipping; the merchant finds transportation for his goods in foreign ships at a lower rate than he could afford to transport them himself, and so he builds no ships.

Competition in freights has of late years reduced rates to a minimum; fleets of ships are making little more their expenses, and within a few weeks Italian vessels—the closest sailed of all—have been reported as lying up rather than accept the rates offered.

Under these circumstances, the claims of those engaged in the new movement that subsidized vessels will, by being able to offer fair wages, attract the American sailor once more to the merchant marine, seem unfounded.

INSTINCTIVE CLAIM TO PROPERTY.

A manifestation of the feeling that a real title to property can exist and can be transmitted, and that it is worth a hard fight to maintain one's rights rather than be unjustly dispossessed, may seem perhaps a range of mental action beyond that which we should fairly expect to find among birds. But an instance which occurred under the writer's personal observation shows the feeling sharp and clear, and is worthy of record.

The place was at the Hot Springs of Partswick, in Mono County, Cal. The contending parties (and their successors) were a family on one side of California linnets (*Carpodacus familiaris*) and on the other of barn swallows. The linnets are permanent residents, while the swallows are migratory, and do not usually arrive from the south until the linnets have commenced nest building. In the present instance, a pair of linnets had just finished their nest, on a horizontal beam of one of the ranch houses, when a pair of swallows arrived, and for some reason—I cannot imagine what—decided to occupy the same spot. There was abundance of space on every hand, equally desirable, but that did not influence them, and a fierce conflict forthwith ensued. They attacked the linnets, and after several days of hard fighting drove them away, and at once proceeded to build their own nest *directly upon the linnets' nest.*

A linnet's nest is built of light materials—grass stems, roots, etc.—while a swallow's nest is built of mud. Of course the mud nest completely weighed down and flattened the light mass beneath it, almost hiding it from sight. The brood of young swallows was successfully reared, and departed in due season for Mexico and beyond.

In the ensuing spring a pair of linnets took possession of the strange object—the pile of grass below and mud above—and built their nest on its summit. There can be, I judge, no doubt that it was the same pair that had been so unjustly dispossessed the previous year. It seems impossible to believe that any others could have selected so strange a site for their nest; in their own case we may presently discern a reason. They had but just finished it when a pair of swallows appeared, and the events of the previous year were repeated—the battle, the defeat, and the completion of the fourth nest. And in the succeeding year this strange history was again worked out, and also in the year following, and it was then that the writer saw it. The resulting compound structure was a curious, and probably unique, rough column four to five inches in diameter, and perhaps twelve inches high. It consisted of eight nests, a linnet's and a swallow's alternately, and in the upper nest, the eighth, a barn swallow was sitting on her eggs as contentedly and happily as though she had not won her place and home by robbery and ruin.

It was an astonishing sight, and it was very suggestive as to the mental powers of those that had been engaged from year to year in its construction. In the first place, we have the question, Is the pairing of birds (as in our marriage contracts) a permanency? If it is so, an explanation of the events noted becomes easier, for both linnets would be equally outraged. If, on the other hand, their mating is only annual, as is commonly believed, the female would be naturally the one that would cling to the home. But in either event, the evidence is clear that the sense of justice was violated, the claim to property honestly possessed was trampled upon, and the resentment thus aroused rankled in the linnet mind through the entire year. No other motive could have existed for the building of the nest on that strange and inconvenient spot, the last year's swallow's nest. It could only have been for the purpose of seeking a partial satisfaction by maintaining the claim to that which had been lawfully their own.

The swallows, on the other hand, were robbers from the outset, and why should they in the second spring wish, at great waste of convenience, to repeat the robbery of the previous year? And assuming that their contract was for the year only, the mental processes and trains of thought by means of which the female was able to explain to her new partner the full history of the past, and to convince him that he must fight for his home before he could have it, involve a logical ability, a persistence of determination, and a command of language which are almost incredible.

And it must not be forgotten that all this was done over and over again, the second, third, and fourth year. If we cannot respect the swallows' morals, we certainly must admire the intellectual power displayed by each of the parties.

Chasing Screw Threads.

One of the oldest of methods of forming a screw was to start the thread by a single point cutter and finish with a chaser of several points or teeth. It has been conclusively proved by demonstrative tests that our operating—reproducing—screws in general use are defective in uniformity of pitch, and very accurate machinery and very careful methods have been built and introduced to remedy the defect. These means are quite expensive, and this expense has deterred some shop managers from adopting them. One of these mechanics, a thinking workman, has tried a reversion to an old method, with modern improvements. He claims that he can chase a thread with almost mathematical exactness, sufficient for the requirements of fine machinist work. His method is not peculiar, except in the care taken as to details. He uses a single point screw cutting tool to start and seat a thread, as is usually the method. Soon as the thread is defined, he puts in a chaser having perhaps six, eight, or ten threads, each of them a cutter, that is, each of them left sharp at the top. This is run squarely along the thread, the after teeth cutting or scraping something more than the leading tooth. This chaser forms the thread, but for a final finish he puts in a chasing tool only the first or forward tooth of which is a cutter, the others being merely followers and guides. With this arrangement he claims that the error of the first tool cutting may be rectified, or at least reduced, by the following teeth of the chaser, which have a bearing on six, eight, or more teeth simultaneously. Perhaps his theory is faulty, but it has been proved by experiment and practice that he has made an improvement on the ordinary method of screw-threading.

Paper Tiles.

A roof claimed to be superior to that of slate, because of its lightness and other advantages, is now made of any fibrous pulp. From this material tiles of any shape desired are formed by pressure under machinery, or by any other method which may suggest itself.

Pressed into the designs wished for, the pulp tiles are partially dried, previous to being subjected to a waterproof solution. Thoroughly impregnated with the preparation to resist moisture, they are baked to harden in them the waterproof mixture.

After the baking, the tiles are treated to a mixture imparting an enameled surface; to this is added a coating of sand, whereby the pulp is rendered proof against the action of heat or flame.

By the use of different colored sands a variety of tints may be imparted to the tiles, which, after the application of the enameling mixture and sand, are baked a second time, after which they are ready for use.

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ASPECTS OF THE PLANETS FOR NOVEMBER.

NEPTUNE

is morning star until the 16th, when he becomes evening star. Though his ascendency is short lived, he takes the lead on the November record, for on the 16th, at 3 o'clock in the morning, he reaches the most interesting epoch in his course—his opposition with the sun. He then passes from the sun's western side to his eastern, and becomes evening star in technical classification, though in reality he has been evening star for several months. He is nearest to the earth, or in line with the earth and the sun, the earth being in the middle. But in order to be at his nearest possible point to our planet, he must be in perihelion as well as in opposition. Under these rare conditions, for he is in perihelion but once in his long circuit of 165 years, his distance from the earth is 2,629,360,000 miles. Under opposite conditions, in aphelion as well as conjunction, his distance is 2,863,183,000 miles. These figures give little idea of the vast realm of space to be traversed before the abiding place of the most distant known member of the solar brotherhood is reached.

There are advantages, however, to be derived from the opposition of a planet as far away as Neptune. He may never be seen with the naked eye, but is in the best position for telescopic observation. A good glass will quickly show the difference between this planet and a star, for it will bring out a disk, while a star will forever remain a point, even in the most powerful telescope.

Observers who wish to look for Neptune will find the present the most favorable time. He may be found about 7° south of the Pleiades, and about the same distance west of Aldebaran. He takes on the form of a small round disk, of a pale blue color, and is accompanied by a satellite, a point of light close to the primary.

Neptune, though the most distant planet, has the shortest synodic period of any of the outer planets, traveling from opposition to opposition again in about 368 days. Thus, knowing the time of opposition for one year, it may be found for the next by adding three days. This computation is approximate, but will answer for all ordinary purposes. The reason is plain. The earth makes the circuit of the ecliptic in a year, passing through one constellation of the zodiac in a month. Neptune moves so slow that it takes him 165 years to make a revolution around the ecliptic, or more than 13 years to move through a single constellation of the zodiac. The earth, therefore, after completing a revolution, will overtake her slow-moving brother in about three days, when sun, earth, and Neptune will be in line, and a synodic revolution will be completed.

The most interesting point concerning Neptune is the possibility that he may be the agent for detecting a planet traveling twice his own distance from the sun—an ultra-Neptunian planet, as it is called. Astronomers are diligently sweeping the skies with this purpose in view, founding their expectations upon analogy and some unaccountable perturbations in the movement of the planet who has been a known member of the solar family for only forty years.

The right ascension of Neptune on the 1st is 3 h. 30 m.; his declination is 16° 11′ north; his diameter is 2·6″; and he is in the constellation Taurus.

Neptune rises on the 1st at half past 5 o'clock in the evening; on the 30th he sets about half past 5 o'clock in the morning.

VENUS

is evening star. Nothing in planetary presentation is more charming than her nightly appearance in the western sky in the early evening. Almost as soon as the sun sinks below the horizon she springs into being, and for a time reigns alone, no other star bearing her company. She grows dazzlingly beautiful as the shadows darken and, as she quickly follows the great luminary below the western hills, wins a tribute of admiration from every beholder, and leaves behind her but one regret—that her presence in the sky is of so short duration. There is a great improvement in this respect during the month. At its commencement, the fairest of the stars delights the observer for two hours after sunset. At its close, she lingers in the west for three hours after the departure of the great luminary. The path of Venus has tended to the south for several months, but, after the 10th, she turns her steps northward. This will increase the length of her stay above the horizon, and bring her into better position for observation.

The right ascension of Venus on the 1st is 17 h. 31 m.; her declination is 25° 52′ south; her diameter is 18″; and she is in the constellation Scorpio.

Venus sets on the 1st at 10 minutes before 7 o'clock in the evening; on the 30th she sets at half past 7 o'clock.

SATURN

is morning star on astronomical records, although on the 1st of the month he rises at 8 o'clock in the evening. He is visible nearly the whole night, making his appearance in the east about an hour after his fair rival Venus disappears in the west. He reigns as sole representative of the visible planetary brotherhood until midnight, when Mars appears upon the scene, while about the time he reaches the meridian, Jupiter looms above the eastern horizon. Saturn is in fine position for star gazers during the whole month, for he is just past perihelion, approaching opposition, nearly in his highest northern declination, and his rings are open to their widest extent. Observers are wise who carefully study his present aspect, for a change will before long be perceptible, and many years will roll on before his present serene splendor and clear light will again gladden our eyes.

Saturn has been moving eastward, or in direct motion, but is now retrograding, or moving backward, and will keep on this course until the end of the year.

The right ascension of Saturn on the 1st is 6 h. 35 m.; his declination is 22° 17′ north; his diameter is 18·2″; and he is in the constellation Gemini.

Saturn rises on the 1st a few minutes after 8 o'clock in the evening; on the 30th he rises soon after 6 o'clock.

JUPITER

is morning star. He is now far enough from the sun to make a fine appearance in the small hours of the morning, rising about 3 o'clock on the 1st of the month, and at 1 o'clock at its close. He takes the lead of the starry host as soon as he makes his advent, outshining them all, as he makes his stately march to the zenith. Unfortunately for terrestrial observers, his course tends southward, almost touching southern declination when the month closes, and six years must pass before he makes the circuit of the six southern constellations of the zodiac. Planets are not in the best condition for observation when in southern declination, for, like the sun, their stay above the horizon is shortened for northern observers. Jupiter may be found between Regulus and Spica, almost directly in the east.

The right ascension of Jupiter on the 1st is 11 h. 52 m.; his declination is 2° 1′ north; his diameter is 30·6″; and he is in the constellation Virgo.

Jupiter rises on the 1st about a quarter before 3 o'clock in the morning; on the 30th he rises soon after 1 o'clock.

MARS

is morning star. He is slowly increasing in size and in ruddy hue, and may be easily found in the eastern sky by his vicinity to well known stars. On the 4th he passes 1° north of Regulus, and on the 16th he passes 2° north of Rho Leonis. He shines with a red light, plainly distinguishable from the twinkling points around him.

The right ascension of Mars on the 1st is 9 h. 58 m.; his declination is 14° 8′ north; his diameter is 6·4″; and he is in the constellation Leo.

Mars rises on the 1st just after midnight; on the 30th he rises about a half past 11 o'clock in the evening.

MERCURY

is evening star. On the 30th, at 6 o'clock in the evening, he reaches his greatest eastern elongation, being 21° 21′ east of the sun. He may, about that time, possibly be visible to the naked eye, but it will be a difficult matter to pick him up, for he sets an hour and a quarter after the sun, and is in southern declination. He must be looked for, in the west, three-quarters of an hour after sunset, a short distance west of the inverted dipper in Sagittarius.

The right ascension of Mercury on the 1st is 15 h. 6 m.; his declination is 18° 31′ south; his diameter is 4·8″; and he is in the constellation Sagittarius.

Mercury sets on the 1st at 5 o'clock in the evening; on the 30th he sets at half past 5 o'clock.

URANUS

is morning star.

The right ascension of Uranus on the 1st is 12 h. 21 m.; his declination is 1° 33′ south; his diameter is 3·5″; and he is in the constellation Virgo.

Uranus rises on the 1st about half past 3 o'clock in the morning; on the 30th he rises about half past 1 o'clock.

THE MOON.

The November moon fulls on the 22d, at 4 h. 39 m. A.M. On the 3d, three days before her change, the waning moon is in conjunction with Jupiter, at 4 h. 12 12 m. A.M., being 52′ south, the crescent and the bright planet making a lovely picture on the morning sky. On the 3d, our fair satellite also draws near to Uranus, at 5 h. 17 m. P.M., passing 18′ north. On the 7th, the new moon of the 6th is in conjunction with Mercury, at 3 h. 47 m. P.M., being 6° 16′ north. On the 10th the moon is at her nearest point to Venus, at 2 h. 35 m. P.M., being 7° 49′ north. On the 21st she is near Neptune, at 4 h. 55 m. P.M., being 2° 40′ south. On the 24th she is in conjunction with Saturn, at 5 h. 26 m. P.M., being 3° 59′ south. On the 29th she is in conjunction with Mars, at 4 h. 12 m. A.M., being 3° 23′ south. On the 30th she again swings her ponderous orb near Jupiter, at 5 h. 24 m. P.M., being 21′ south, approaching the planet much nearer than on the conjunction of the 3d.

NOVEMBER

is not as fruitful in incidents as many of the months that have preceded her in the now rapidly fleeting year. She presents, as prominent in importance, the opposition of Neptune, when the planet third in size among the brotherhood draws nearest to the earth on his unseen path, and gives the telescopist the best chance to learn something new concerning the huge sphere that, in our view, takes on the form of a tiny blue disk, no larger than a little ball that serves for a child's plaything, but is in reality nearly a hundred times the size of the earth. She presents, also, on each clear evening one of the loveliest pictures that glows on the celestial canvas. It is that of the peerless Venus shining in the west as the radiant evening star, deigning to show her bright face as soon as the sun is lost to sight, and growing more bewitchingly beautiful till her turn comes to descend below the western hills. Saturn is another gem in the November sky, Jupiter dons his brilliant robe in the small hours of the morning, and Mercury may be seen in fitful phase as the month closes.

November holds one source of unfailing interest, for during her reign the earth plunges headlong through the November meteor zone. Those who watch on the nights of the 12th, 13th, and 14th will find proof of the passage in a few stray meteors radiating from the constellation Leo, and set on fire by a concussion with the earth's atmosphere. The November meteoric showers are caused by the earth encountering a swarm of particles following Tempel's comet in its orbit. The swarm of meteoroids is not yet equally scattered, and the earth meets the densest portion once in 33¼ years. A grand display marks the passage. The heavens seem to be on fire, and the sublimity of the scene is indescribable. Chinese, Arabian, and other records give accounts of meteoric showers that occurred centuries ago.

Humboldt, while traveling in the Andes, saw a wonderful shower in 1799. One was seen in this country in 1833, another occurred in 1866–67, and one is confidently expected in 1899. The November meteor zone is a gigantic hoop or ellipse, crossing the earth's orbit at a point passed by our planet on the 13th of November, and extending beyond the orbit of Uranus. It has a period of 33¼ years. Leverrier thus accounts for its presence in the solar system: As far back as the year 126 of our era the planet Uranus captured a meteoric comet, and imprisoned it within the boundaries of the sun's domains. The comet is disintegrating, and the meteoroids are slowly extending over the whole zone. When this takes place, thousands of years hence, the great displays will cease, and a greater number of falling stars will be seen every year. As nothing is more uncertain than the behavior of comets and meteors, it is well to be on the watch. It may be that the observers of the present year will find a rich harvest to reward their labor. The best time for observation is about 3 o'clock, when the constellation Leo, from which the meteors radiate, is about half way between the eastern horizon and the zenith.

Use of Shorthand.

The use of shorthand in the trial of causes in courts is having the effect of greatly lengthening out the record of causes, making it expensive in case of appeals, requiring also a great deal of time in examining a case at the hearing on appeal. This subject attracted the attention of the American Bar Association at its late session at Saratoga, where the following suggestion was adopted: "The record of a trial should contain short hand notes of all oral testimony, written out in longhand, and filed with the clerk; but only such parts should be copied and sent to an appellate court as are relevant to the point to be discussed on the appeal; and if more be sent, the party sending it should be made to pay into court a sum fixed by the appellate court, by way of penalty."

Judges are also beginning to complain of the increased amount of labor imposed upon them in examining written arguments of counsel where the same are prepared through the aid of shorthand writing. In such cases it is found that lawyers do not present their points as clearly and concisely as if written out by themselves in the usual way. This, however, does not argue against the use of shorthand; it only shows that lawyers should use more care in the preparation of their arguments by presenting their points as concisely as possible.—*The Legal Adviser.*

The Pennsylvania Aerolite.

In a recent communication to *Science*, Prof. Langley states that so many inquiries concerning the reported meteorite were directed to Allegheny Observatory, that he finally sent a competent observer to the alleged locality of the fall in Washington County, in order to find out the true facts in the case. An investigation on the spot, however, failed to discover any meteorite. One undoubtedly passed over the spot, and was seen to burst in midair in a southerly direction from the town of Independence. The report, according to one of the spectators, was heard a minute or more after the explosion was seen; from this and the apparent height at which the meteor burst, it is inferred that the actual explosion occurred twelve or fifteen miles to the southward, when the meteor was still two or more miles above the earth. No fragments are as yet known to have been found. The amount of romance mixed up with earlier accounts has exceeded even our somewhat large expectations.

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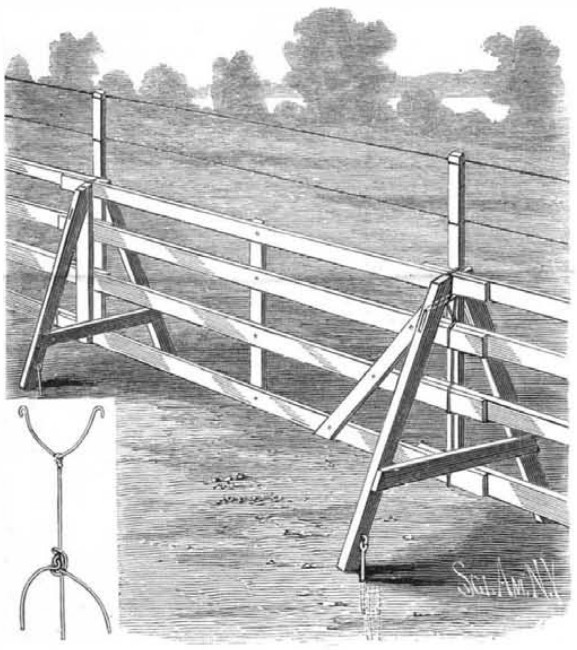
AN IMPROVED FENCE.

The invention herewith illustrated shows a fence that is calculated to stand firmly in heavy winds, and one that can be made, set up, and removed quickly at a reasonable cost. The side braces are firmly held by stakes driven into the ground without digging, these being connected with the braces by stout galvanized wires, and the braces firmly holding uprights which press against the boards or rails of the fence. Where these opposite braces meet they are held by a metal tie



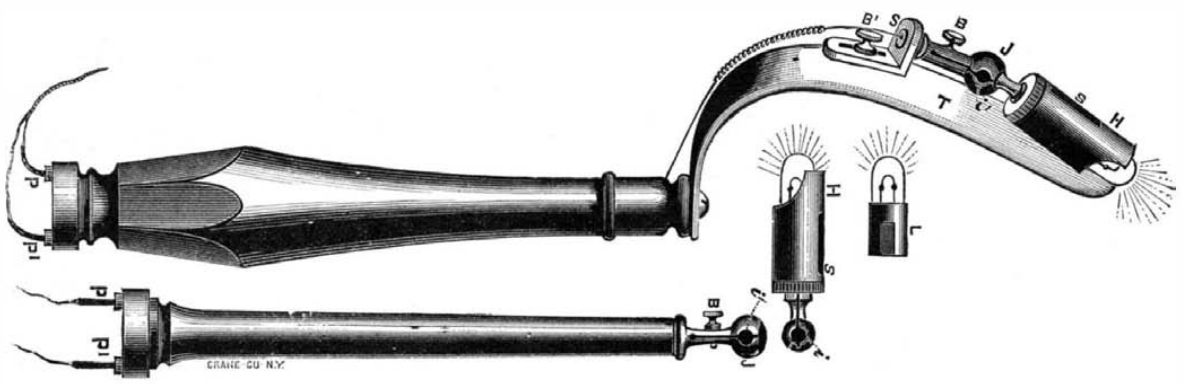
READ'S IMPROVED FENCE.

bar or rod, which also supports the top rail and from which depend hangers supporting the lower rails. These hangers consist of strong wire bent upon itself and formed with hooks and loops, with a button over the bends where the rest is formed, and thus binding together the end portions of the rails. The uprights are also extended a sufficient distance above the top rail to afford support for one or more wires, and thus increase the height of the fence as may be desired, these wires being either barbed or plain.

This invention has been patented by Mr. John W. Read. Particulars can be had from Read Bros., of West Salem, Ohio.

AN ELECTRIC LARYNGOSCOPE.

The accompanying illustration, showing one of the most recent applications of electricity in the perfection of instruments for the use of surgeons, physicians, and



MEYER'S ELECTRIC LARYNGOSCOPE.

dentists, is the invention of Mr. Curt W. Meyer, of 357 Fourth Avenue, New York city. It is an instrument to illuminate and assist in exploring the cavity into which the nose and mouth enter, at the base of the tongue, T being a tongue depresser, with an insulating handle, through which conducting wires are passed to connect with battery cords at P P′. The inventor has also constructed a special battery for use with this laryngoscope. An electric incandescent lamp, L, is mounted and set in a shield tube, H (which is a non-conductor of heat), with a double conducting ball-joint movement, J, and an adjustable slide, S, which holds the lamp, and which is held firm to the tongue depresser by a set screw, B′, the lamp being set firm in any desired position by the binding screw, B. The lamp can be brought in broken circuit at *i′* by slightly turning the lamp tube, H, and the latter, with its ball-joint, can be detached from the tongue depresser and set in a different handle; or it may be removed from the shield tube by pushing it out through the slot, S. Each of the battery cords contains twenty-one No. 40 wires, is two yards in length, and well insulated. For diagnosing and the examination of interior cavities this instrument has advantages which commend it to the attention of the medical profession.

THE Board of Management of the new American Exposition to be opened this winter at New Orleans has invited bids for an electric railroad in the grounds.

The Mississippi Reservoir System.

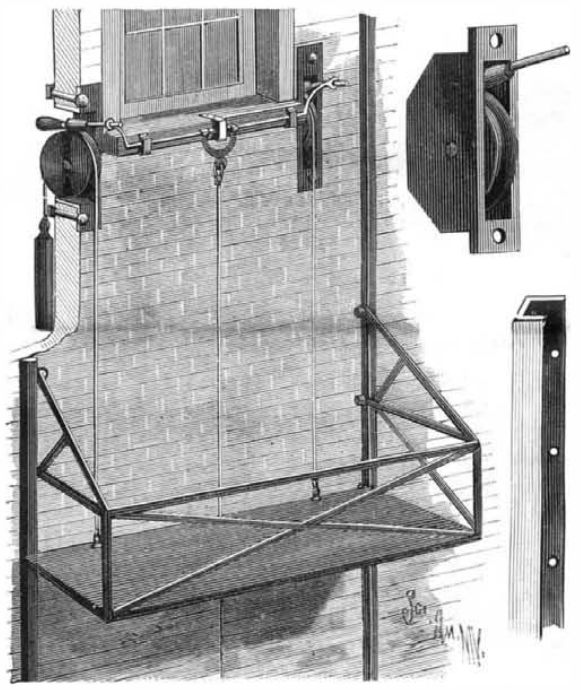
A special dispatch to the Chicago *Tribune* from St. Paul, Minn., says: The Government engineers have made the following report on the reservoir system: The reservoirs at Leech Lake and Lake Winnebigoshish were opened August 1 with a large discharge. Pokegama reservoir, the receiving reservoir, 100 miles by water below the upper reservoir and 398 miles by water above St. Paul, was opened August 15 with a discharge of about 3,000 cubic feet of water per second. The rise in the Mississippi River at different points since, and resulting from the discharge from the reservoir, was, September 1, at Grand Rapids, four miles below Pokegama, five feet; Aitken, 169 miles below Pokegama, two and one-half feet; Crow Wing, 236 miles below Pokegama, two feet; Sauk Rapids, 295 miles below Pokegama, two feet; and up to the 7th the river was still rising at all points heard from since the 1st of September.

The river at St. Paul fell from August 1 to August 23 one foot and three inches. Since then the St. Paul gauge shows an average stage of three feet up to September 7. As there was no rainfall of any importance from August 1, the river must have continued falling at about the same rate as its tributaries, and probably at not far from the same proportion as from the 1st to the 23d of August, had it not been for supplies from these reservoirs. As closely as can be estimated, the reservoirs are furnishing not far from one foot of water at St. Paul. These reservoirs only have been completed: Leech Lake, Lake Winnebigoshish, and Pokegama Falls (a distributing reservoir with but little holding capacity). The first two have a capacity jointly of about 60,000,000,000 cubic feet when full. The fourth reservoir, at Pine River, will be completed this fall. It has a holding capacity of about 7,000,000,000 cubic feet, and is about 220 miles by water above St. Paul. The accumulation of water in the upper reservoirs, Leech Lake and Lake Winnebigoshish, in 1885 has been very large, between 35,000,000,000 and 40,000,000,000 cubic feet.

A much larger discharge could have been made, but the amount was considered large for the experimental discharge this season. In regard to the diminished rise in the river as the distance from point of discharge increases, it must be remembered that all sloughs, rivers, lakes, etc., adjunct to the river must be raised to the same height as the main river before a full effect and benefit can be received. It is expected that the total rise at Crow Wing and Sauk Rapids will not be far from four feet when the full effect is reached. It is as yet impossible to say what the full increase at St. Paul will be. Something between one and one and a half feet can, however, be confidently expected. While prevention of the river falling is less noticeable than its rise, yet the real effect is the same so far as navigation is concerned. As a result, therefore, of what has been done—and the work has hardly commenced—we have a clear and convincing proof of the wisdom of this great undertaking and the assurance of its success.

FIRE ESCAPE.

Secured vertically to the side of the building are tracks upon which a car travels upon and down. The car is rectangular in form, and is composed of longitudinal bars connected at their ends by bars whose inner ends project and carry rollers which slide upon the track, the outer wings of the track preventing the detachment of the rollers. The longitudinal and cross bars are connected and braced by diagonal bars. The form of the rails is clearly shown in the lower right hand view. Extending inwardly from the outer corners of the car are rods set at an incline; and which carry rollers working upon the tracks. Secured to the wall of the building adjacent to the lower sill of the window are brackets in which pulleys are journaled. Ropes or chains, secured at one end to the inner side of the car, pass over the pulleys and have weights fastened to their other ends. By this arrangement, when a load is removed from a car the same will, through the agency of the weights, ascend to the window, so that another load of passengers can be lowered. Secured to the sill of the window are brackets in which works a bar having a slight vertical movement. Pivoted in the pulley brackets are brake arms, the inner ends of which are weighted, and which are provided with brake shoes. These arms are placed above the pulleys, so that when their outer ends are lowered the shoes will bear upon the pulleys, and serve to check the speed of their revolution. The outer ends of the brake arms are connected with the crossbar, attached to the middle of which is a rope sufficiently long to reach to the ground, in order that the brakes may be operated at any point during the descent of the car.



DAVIS' FIRE ESCAPE.

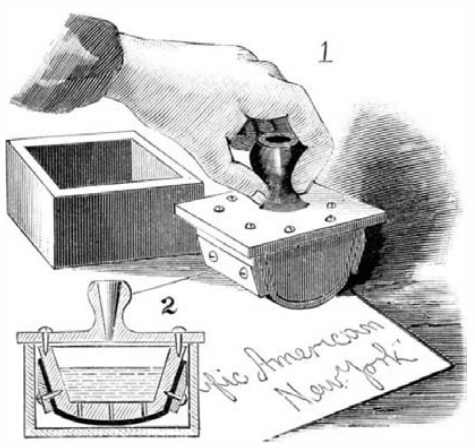
As will be seen, this fire escape, the invention of Mr. Daniel F. Davis, of 1029 Washington St., Easton, Pa., is simple in construction, and may be easily and quickly operated.

Dry Distillation of Wood.

It appears from the author's experiments that the yield of crude pyroligneous acid, tar, charcoal, and gas is almost the same with the most different woods. But the richness of the acid waters in acetic acid and consequently the yield of dehydrated acid vary greatly. In this respect the wood of coniferous trees is the least valuable. The wood of the trunk furnishes more acid than that of the branches. The wood yields more acid than the bark, and sound wood more than dead wood. Rapid calcination yields more gas at the expense of the condensed products and of the charcoal; it yields also the weakest acid waters, and the charcoal is more hygroscopic than that furnished by a gradual action.—*M. Senff.*

STAMP MOISTENER.

The moistener is made with a piece of wool, felt, or other fabric that will absorb water and give it off under pressure, secured to the bottom of the water reservoir by end cleats. The reservoir is made with a rounded bottom, on which the fabric rests, and with inclined ends. The sectional view, Fig. 2, clearly shows the construction. Through the bottom of the reservoir are holes, through which water can pass to the fabric; the reservoir is filled through a hole in the handle attached to the cover, which is held by screws, a packing being placed between the cover and reservoir top. When not in use, the moistener is placed in a watertight case, shown in Fig. 1. To use the moistener, it is grasped by the handle, and the fabric pressed upon the surface which is to receive the stamp. The stamp is then placed on the moistened surface, and a blotter pressed upon it to affix it to the package or envelope. The device is simple and inexpensive, and obviates the neces-



WHARMBY'S STAMP MOISTENER.

sity of moistening the stamps by the tongue in the usual way, and also the rubbing the paper surface, as with a sponge.

This invention has been patented by Mr. Thomas W. Wharmby, of 19 Mandrake Street, Cleveland, O.

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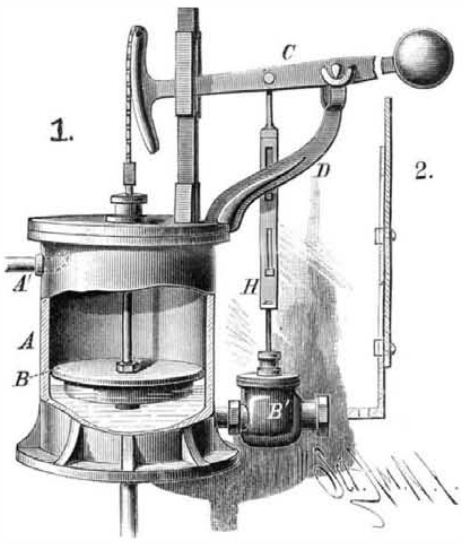
STEAM TRAP.

The engraving represents an improved steam trap for steam heating apparatus. The cast iron receiver, A, is connected by a coupling, A′, with the steam coil, and fitted in one side is the outlet valve, B′; the space in the receiver below this valve serves as a trap for sediment entering with the water of condensation. The weighted float, B, is connected with the lever, C, by a chain and rod which passes through a stuffing box. The lever is fulcrumed upon the upright, D.



TAYLOR'S STEAM TRAP.

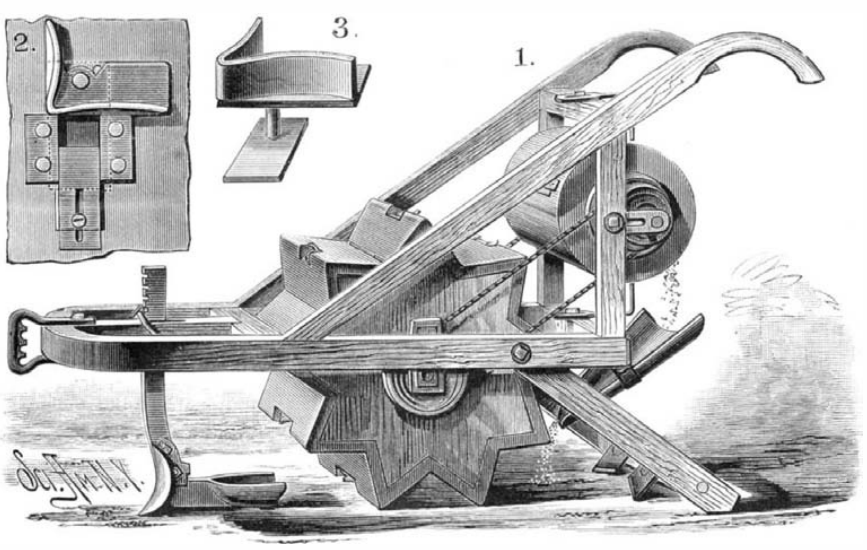
and is furnished with a weight that may be adjusted to balance the float. The valve, B′, is connected with the lever by an extensible connection, shown in section in Fig. 2. The lever is prevented from moving too far upon its fulcrum by a guide and stop plate secured to the top of the receiver.

The water of condensation, entering the receiver, raises the float until the upper water level is reached, at which point the valve begins to open by the further movement of the lever; the surplus water in the receiver is thus allowed to pass out the cock. It will be seen that the float is kept constantly moving, to prevent the liability of its sticking. The valve is always closed at a point below the low water level, thereby preventing at all times any escape of steam. By opening the blow-off pipe at the bottom of the receiver, all sediment and foreign matter trapped out of the water can be removed. By using a heavy float counterbalanced by a heavy weight, a positive action of the trap is obtained, as the water in receding from the float will give a great difference in weight over the counterbalance.

This trap is the invention of Mr. W. W. Taylor; particulars can be had from Messrs. Taylor Brothers, 124 to 128 St. Joseph Street, New Orleans, La.

IMPROVED SEED PLANTER.

The seed planter herewith illustrated makes a clean furrow and evenly ridges the earth on the dropped seed, plants two or more kinds of seed at once and at any desired distances apart, and also drops seed and a fertilizer simultaneously. The machine frame has a bowed front and cross bars, between which is a longitudinally ranging beam through which the standard of the furrow opening plow passes; the plow and its drag are so supported that it can be held at any desired height, to work deeper or shallower in the ground. The drag is connected to the plow so that it lines with the longitudinal center of the plow; lateral play of the drag is prevented, and if at any time it is not needed, as in planting some crops, it may be quickly swung up out of the way or removed. The opposite sides of the drags are formed with diverging plates which pack and smooth the furrow opened by the plow, and insure the dropping of the seed to the bottom of the furrow and at a uniform depth in the soil. The seed or fertilizer holding drum has closed ends, and a periphery formed in a series of projecting angles, one of which is hinged to allow the seed or fertilizer to be placed in the drum, which, as it rolls over the ground, also acts as a clod crusher when the drum is used to plant cotton seed in lumpy soil, at which time free vertical play of the drum is obtained by journaling the shaft in boxes sliding vertically in slotted plates fixed to the side bars of the frame.



LAUDE'S IMPROVED SEED PLANTER.

Provision is made for preventing this vertical movement when it is not necessary. On the drum shaft are cone chain pulleys, from which the driving chains lead to pulleys on the shaft of the upper seed cylinder. This cylinder may be adjusted to or from the other, so that the chains may always be kept taut when set to give varying speeds to the drums for dropping the seed at different distances apart. The rear seed drum is made with a central lengthwise partition, so that two kinds of seed may be planted in alternate hills; this partition is removable. The lower drum at the center of its angles, and also the other at two or four diametrically opposite points, are provided with pockets from which the seed is discharged by the action of valve plates. By means of properly arranged tappet arms, the valve plates are shifted to open the pockets toward the interior when the pockets are up; the pockets become filled as the drums revolve, and when at the lower points, the valve plates are shifted by other tappet arms to open the pockets and permit the seeds to drop. The seed can be dropped in a bunch or scattered, as desired, and the size of the pockets can be varied so as to drop any quantity of seed. The seeds in the furrow are covered by right and left hand hoes or blades attached to a crossbar connected pivotally to the side bars of the frame in the rear of the lower drum. If not needed, the upper drum can be removed; and when both drums are used, seed may be dropped from either, while a fertilizer is dropped from the other.

This invention has been patented by Mr. Joseph Laude, of Monticello, Ark.

Simple Method of Cutting Glass.

Most of our readers are familiar, either by practice or reading, with the method adopted often in the laboratory or elsewhere for dividing glass by a hot rod. If a bottle is to be cut into two pieces, a notch is filed in its side. Then, by applying a hot iron or glass rod, first on one side then on the other of the notch, a smooth crack half an inch long will sometimes form. But as this does not always take place, and as in cutting glass only one of the pieces is wanted, a crack may be started well away from the desired place. Assuming such a crack to be formed, it may be led in any direction by slowly moving in advance of it, and in contact with the glass, the end of a pipestem, of an iron or a glass rod, heated to a full red heat. The speed with which the rod is to be moved depends on the crack. It should be kept about a quarter of an inch in advance thereof, and should be moved continually away from the end, as the crack extends itself. In this way a flask can be cut into a spiral, or heavy plate glass divided with fair accuracy.

The great point is to have the line of the cut well marked. If a bottle is to be cut off, to make a battery jar for instance, a string tied or a rubber band sprung around it about a quarter of an inch from the place of division forms a convenient guide. The cut may be carried around parallel with the string or band. Then a half hour's grinding on a horizontal pane of glass, with sand, camphor, and turpentine, will finish the edge perfectly. In marking the place for cutting, a pointed piece of soap may be used, as a string can only be employed on cylindrical objects. This method of working is attended with one inconvenience. Unless a rod of large size is used, continual reheating is necessary. A glass rod as thick as a penholder will carry a cut about two inches at a heat. A pipestem or tenpenny nail will do the same. To obviate waiting, several rods may be used, some heating while one is in use.

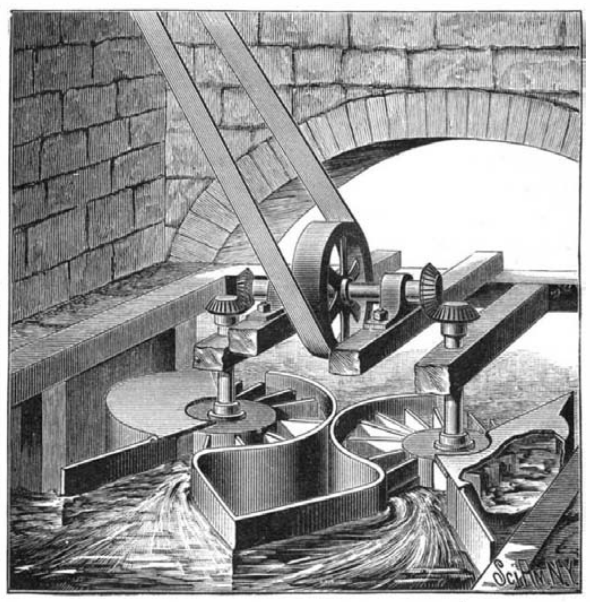
A fine gas jet, burning from a fine glass jet at the end of a rubber tube, has also been suggested, but is inconvenient. A receipt is given for making little carbon pencils, that burn with flameless incandescence, to be used instead of a heated rod. These, however, are troublesome to make.

The use of what is sold by the fireworks dealers under the name of punk was suggested by a consideration of the points given above. This substance burns slowly, without flame, and maintains a strong incandescence until quite consumed. The incandescent part takes the shape of a cone, like a sharpened pencil. As long as the piece lasts, its burning end maintains this form. By blowing upon it, the heat can be materially increased. On trial, it was found to cut glass perfectly. The only objection to it is that if rubbed against the glass the ash soils its surface, so that the progress of the crack cannot be conveniently watched. But in practice it is not necessary to hold it in contact with the glass, as it radiates heat enough to lead the crack, if held very close and not in absolute contact therewith.

By using punk, the trouble of shifting from rod to rod, and the necessity of a source of high heat, a Bunsen burner generally, is obviated. The punk can be lighted with a candle, or even with a match, and is ready for use immediately. A long stick will last for half an hour, enough to do a great deal of work. The only difficulty is in starting the crack. It may be done by heating the glass, and touching it with a drop of water. This generally starts several, and the one pointing in the most convenient direction may be chosen, and carried where desired. The method first spoken of as applicable to bottles, that of filing a notch and heating the glass first on one side and then on the other, cannot be depended on. S. T.

WATER WHEEL.

The current of water entering the sluiceway divides its force equally between the wheels. Each of the wheels is provided with buckets pivoted to the hub, which is mounted on an upright shaft rotating in bearings on the frame; these shafts transmit their movement by beveled gear wheels meshing in wheels on the ends of a horizontal shaft carrying the driving pulley. The sluiceway is divided by an angular partition in such a manner that each of the wheels receives an equal share of the water. The partition rounds off into rims partly encircling the wheels, holding the water upon them and preventing any waste. The folded returning buckets are inclosed in a case provided at its forward end with a stationary entrance partition, which, in connection with hinged gates which may be closed across the main entrances, directs the current of water on the buckets. The buckets are provided with curved hinges forming stops, and are hinged in such a manner in an annular groove of the hub that they open radially when struck by the current, and fold when the water leaves them at the rear. By closing one of the gates, the full force of the water will be directed against the other wheel. It will be seen that the current will exert its force against nearly half of the buckets, and will only cease to act when leaving them. This invention has been patented by Mr. Joseph B. Collins, of 127 North Front Street, Grand Rapids, Mich.



COLLINS' WATER WHEEL.

Great Waste of Oil.

According to Mr. Edward Atkinson, nearly the whole wool clip now comes to market unwashed; and out of the 320,000,000 lb. of domestic wood now used, there must be 25 per cent at the least, or 80,000,000 lb., of a very valuable oil now thrown into the rivers and wasted, while polluting both the water and the atmosphere.

When the "suint" is refined, a thick, viscous oil is obtained, which is absolutely free from oxidation, and which is, therefore, the most valuable oil for currier's use which can be found. The residuum of wool scourings is largely imported from Europe for curriers' use, under the name of "de gras," and the substance also forms one of the ingredients of a mixture which is used for oiling wool preliminary to carding. "De gras" is recovered from wool scourings in Europe by a chemical process; it is very inferior to the fine oil which can be recovered from the wool by the naphtha process, but it may be cheaper.

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PHOTOGRAPHIC NOTES.

New Test Paper for Alkaline Solutions—At a recent meeting of the Society of Amateur Photographers in this city, Dr. H. G. Piffard exhibited a new test paper for testing the alkalinity of toning baths. An ordinary piece of white blotting paper is dipped in a solution of,

Alcohol.....1 ounce,
Phenol-phthalein.....3 grains,

and dried. Speaking of its qualities, Dr. Piffard said: "On immersion in an alkaline fluid, it immediately turns a bright scarlet, and is more sensitive than litmus paper, commonly used. The change of color is much more striking than in the case of litmus, and I have used it for some time in preference to the latter. I am not aware that a test paper of this description has been used before for the purpose indicated, although the reaction in question has been known to chemists for some time."

Formula for Making Blue Prints on Paper.—Mr. T. C. Roche gives the following method of making fine blue prints on paper, wood, canvas, etc., and only requires washing to fix properly:

FIRST SOLUTION.

Red prussiate of potash.....120 grains.
Water.....2 ounces.

SECOND SOLUTION.

Ammonia citrate of iron.....2 ounces.
Water.....140 grains.

The solutions should be made separately, and, when dissolved, mixed and filtered; then pour it into a dish, and float plain photographic paper on it for three or four minutes. When the paper is dried, it will keep for months. Print in the sun for eight or ten minutes; then simply wash the paper under the tap with running water. The result will be a strong blue picture on a white ground. The addition of a little gum arabic water to the above solution, when made, will render the color of the picture richer and the whites purer.

Spiritual Materialization.

Some of our correspondents ask how the so-called materialization of "spirits" is effected, and especially how the "floating lights" are made. The following from the New York *Herald* tells the whole story. It is from a Hartford, Conn., letter of Oct. 8, 1885:

Since the expose of the memorable Katie King swindle in Philadelphia, there has been no more thorough revelation of one of the so-called spiritual mediums than that in this city last night of Mrs. Eugenie Beste, of Washington, D. C. Among her Washington sitters recently was Mrs. James McManus, of this city, daughter of the senior editor of the Hartford *Times*. Mrs. McManus is inclined to investigate the mysterious, including spiritualism. She became convinced that Mrs. Beste was a fraud, and concluded to invite her to Hartford, where the opportunities were better for arranging an *expose*, and she would not have the advantages of her Washington house in avoiding detection. Mrs. Beste was located at a private residence in the city, and gave two *seances* without interference, while Mrs. McManus, with Mrs. Wrisley and other ladies she had brought into the plot, were perfecting their plans.

Last night everything was ripe for the *expose*. A circle of twenty was formed, only five of whom were not in the secret. Two stalwart employes of the *Times* office were concealed in an apartment adjoining the *seance* room, awaiting the signal. A spirit called Nettie emerged from the cabinet, clothed in a long robe which shed a pale phosphorescent light in the darkness. The two men sprang into the room. The spirit gave a piercing shriek, and one exclaimed, "That won't do, old Spirit! we've got you." Lights came; the drapery was torn from the head, and Mrs. Beste's face, ashen with powder and fright, was revealed. Her dress and slippers were found in the cabinet. Her gauze drapery, worn over her underclothing, was saturated with a chemical substance which gave the light, and patches of luminous paint aided the effects.

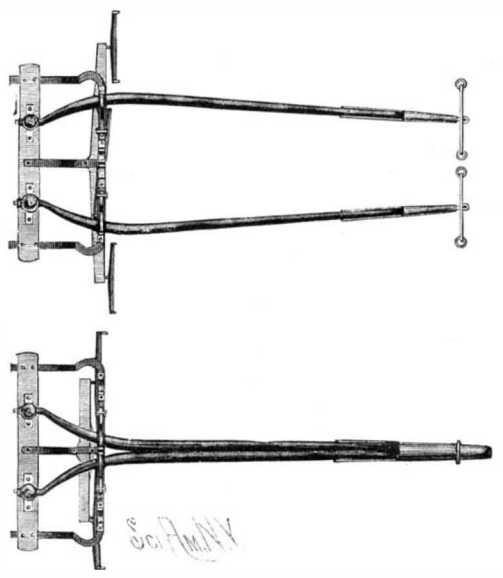
There was nothing left but to confess the fraud, and a lawyer present drafted a full confession, which she signed. In this she recites that she is the person known as "Mrs. Beste, the voice medium;" that her exhibitions of materialization of spirits given in Boston, Hartford, Philadelphia, and Washington were fraudulent; that the materials used were gauze and luminous paint, and the voices of pretended spirits simply manifestations of her own vocal powers. The paper concludes: "And from this date henceforth to the end of the world I shall desist from any further exhibitions."

DURING the month of August enormous swarms of ants passed over the town of Solothurn in Switzerland. They came from the Jura Mountains, and formed a cloud, consisting of seventy-five perpendicular columns, in which the ants circled around in spiral form. The swarm lasted for twenty minutes, the height of the cloud being upward of ninety feet. Millions of them fell to the ground, however, without making any visible change in the phenomenon.

COMBINED SHAFTS AND POLE FOR VEHICLES.

It has been hitherto necessary for those who use a variable number of horses at different times with the same vehicle to possess a corresponding number of separable gear. An invention recently patented by Mr. John Pettinger, of Santa Barbara, California, entirely does away with this expense and inconvenience by providing a combination gear which permits the use of one, two, or three horses at the pleasure of the driver. In his device the two shafts are pivotally connected with a rear crossbar, and are constructed with a curvature such that when they are turned to have their concave sides facing each other, sufficient space is left for an animal to stand between them, as with the ordinary shafts; but, when the two shafts are turned to bring their convex sides facing each other, they are brought together, and form a single pole. These two positions of the shafts are secured by suitable spring locking devices on a bent bar or hound attached to the forward axle of the vehicle.

When the combination gear is to be employed with three horses abreast, an extension thimble, provided with a strap or neck yoke, is placed on the end of each shaft, as shown in our first illustration. In this case a short doubletree, between the shafts, serves as a whiffletree for the middle horse, while a long doubletree extends beyond the shafts on each side, in order to provide for the outer horses. When two horses are used, a double thimble is placed on the forward ends of the two shafts, and is provided with lugs to serve as stops



PETTINGER'S COMBINED SHAFT AND POLE FOR VEHICLES.

for the neck yoke ring, as shown in the second illustration. For use with one horse, the long doubletree and thimbles are simply omitted, and the shafts arranged as ordinarily. The changes necessary for these several uses are quickly and conveniently made, and in all cases the gear is compact and graceful in appearance.

Seeing and Hearing.

It is a well known fact that those who are deprived of one of their senses have usually some compensation in a greater acuteness of the others. The blind will hear sounds that are inaudible to most people. They have been known to detect the presence and position of the smallest sapling on the roadside, simply by the echo of their footsteps. The deaf mute, on the other hand, learns to see what his friend is saying, by the motion of his lips—a feat which to most of us would be impossible. The wonderful degree to which the touch may be developed in delicacy and power of perception is manifest to all who are familiar with Laura Bridgman's attainments.

This superior power, however, is chiefly the result of education and long practice. It is rather acquired skill in using the only means at hand for gaining needful knowledge than any original supremacy in the organ itself. It is strange that with such examples before us of what can be thus accomplished, and fully recognizing the value of such education to those who are deprived of one or more of the senses, men are yet so unimpressed with the need of some similar training for those who are blessed with all of them. With our many complicated systems for developing the mental powers, there is yet no thorough and systematic course laid out for the culture of the eye and the ear. Because Nature does so much in this direction, instead of co-operating with her we leave her to do all, and thus sacrifice much of the possible happiness and usefulness of life. Yet these are the channels through which the mind must be fed, the very means on which we rely for all instruction, and, indeed, all communication; and it would surely seem only rational to make them as perfectly adapted to their work as possible.

There is a woeful deficiency in this respect in a majority of people. Not having been trained to observe with care and scrutiny, they only see a small part of what they look at; and as soon as their eyes are removed, much of even that part fades from their memory. They visit lake, mountain, and forest, and return with only a confused and faint recollection of the treasures of nature upon which they have looked. They meet acquaintainces on the street, and pass them by unrecognized. They pass through picture galleries, gaze on fine edifices, and witness interesting scenes without taking in their meaning, or being able to describe them to others. So in hearing; they only half listen. With a preoccupied mind, they gain only an inadequate or garbled idea of what is said, and a few repetitions from one to another are sufficient to change the whole meaning of the original utterance. Few persons really know how to listen to a lecture so as to carry away with them any well arranged ideas of its plan and substance. Few can even report a conversation accurately; and, as for the sweet sounds of nature's harmony, the soughing of the winds, the ripple of the waters, the humming of bees, and the singing of birds, they fall too often on dull and unresponsive ears.

When we consider how needful to all the departments of human effort the accuracy of the testimony of the senses is, we cannot too earnestly claim their culture. Dr. Thomas Hill puts this none too forcibly when he says: "The errors in the world come less from illogical reasoning than from inaccurate observation and careless hearing. A clear and intelligent witness, who can state precisely what he saw, and who saw everything there was to see; who can repeat exactly what he heard, and who heard everything that was said, is rarer than a sound lawyer or judges. . . . Physicians can rarely obtain from the patient a statement of his symptoms unmingled with theories as to their cause; lawyers cannot get a statement of what a man did uncolored by an imputation of motives for his action; scientific men are well aware that popular testimony to any minute phenomenon is wholly untrustworthy. In short, we should benefit science, art, jurisprudence, therapeutics, literature, and the whole intellectual and moral state of the community if we could raise up a generation of men who would make it a matter of conscience to use their five senses with fidelity, and give report of their testimony with accuracy."

A large part of the culture of the senses consists in securing habits of observation and attention. When the mind is suffered to run upon other things, or to sink into revery or apathy, neither eye nor ear can fulfill their true work. The power of concentrating the thoughts, for the time being, upon the object on which we look, or the sounds to which we listen, will make both sight and hearing more accute and accurate. It is a rare but valuable ability that takes in much at a glance, and has it impressed on the memory. It is in childhood that these habits can be most easily and pleasurably gained. The senses are then more active and amenable to training than the mental powers; and most children would be better and more harmoniously developed if some of the time now spent on books was rigorously devoted to the training and exercise of sight and hearing. Should this subject come to receive a liberal proportion of the care, thought, and talent that education rightfully claims, our children will grow up to be more reliable, more truthful, and certainly happier and more capable of giving happiness to others than their fathers have ever been.—*Philadelphia Ledger.*

The Postal Ounce.

Referring to the Revised Statutes of the United States, Title XVLI., Chapter 3—Mail Matter—we find:

SEC. 3880.—The Postmaster-General shall furnish to the post offices exchanging mails with foreign countries, and to such other offices as he may deem expedient, postal balances denominated in grammes of the metric system, *fifteen grammes* of which shall be the equivalent, for postal purposes, of one-half ounce avoirdupois, *and so on in progression.*

Approved June 22, 1874.

This enactment plainly declares that fifteen grammes shall be the equivalent of one-half ounce avoirdupois, and so on in progression, but not that the half ounce shall be the equivalent of fifteen grammes; consequently the legal ounce, for postal purposes, is thirty grammes, the practice and rulings of the post office authorities to the contrary notwithstanding. As the act above cited was approved by Congress more than eleven years ago, it would appear to be about time for the Postmaster-General to pay attention to it. —*Jour. of Education.*

THE *Northwestern Lumberman* is fearful that there will be much trouble from small pox in the logging camps the coming winter. With an epidemic of that disease in Canada, it thinks it is highly probable that the contagion will be introduced into Michigan and Wisconsin camps—more especially into those of Michigan—by Canadian workmen. It has been proved that a logging camp makes a good foothold for small pox. The men are huddled together, are not cleanly in their habits, or careful about exposing themselves. The operator the coming winter would make no mistake if he insisted that his crew be vaccinated.

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Correspondence.

Value of Tornado Predictions.

To the Editor of the Scientific American:

The attention of Congress is called to the fact that some of the terrible loss of life and property due to tornadoes can be averted. In 1882, Professor T. B. Maury asserted, what was then the fact, the prediction of a tornado was to be attained by the science of meteorology. In less than two years from that time some predictions of tornadoes were successfully made by Lieutenant John P. Finley of the Signal Service. The percentage of verified predictions is steadily increased by knowledge of the average conditions preceding each series of tornadoes, thus making the predictions more definite and local with each succeeding year. Already the predictions of safety for the day are effective. Of 3,228 predictions unfavorable to tornadoes made in 1884, 3,201 were verified; and of 38 predictions that tornadoes would occur, made in April and June, 1884, 18 were verified. Of 19 predictions that tornadoes would occur, made in June and July, 1885, 15 were generally verified. When tornadoes were predicted, in no instance did violent storms fail to occur, either hurricanes, tornadoes, or hail.

The failure of some predictions is doubtless due to inaccurate and insufficient reports from sparsely settled regions. While it is admitted that nothing like absolute control of these phenomena has been attained, yet the above figures clearly justify the presence of tornado signals either of safety or danger at every telegraph station in Kansas, Nebraska, Missouri, Illinois, Iowa, Ohio, Michigan, Wisconsin, Georgia, and North Carolina, especially during April, May, June, July, August, and September. It is hoped that Congress will direct the Signal Service to submit estimates of the expense necessary to establish such a system of signals. The cost would be a few thousand dollars for flags or colored disks, and for telegraph service.

WILLIAM A. EDDY,
Tornado Reporter, Signal Service, U. S. Army.
135 East 16th St.,
New York, October 14, 1885.

The Stone Pile Meadow, Washington Territory.

To the Editor of the Scientific American:

The article on the St. Lawrence chub nests, in the SCIENTIFIC AMERICAN of October 3, goes to explain the stone pile meadow in Washington Territory, on the old road from the Colorado River to Seattle. I think that some years since your journal printed a view of this meadow, filled with just such heaps of stone as the chub makes in the St. Lawrence. It is a very curious geological feature, and has never been explained to the satisfaction of the scientific world. Yet the hypothesis of these large mounds being the nests of some aquatic creature was advanced with a good deal of hesitation by, I think, Mr. Gibbs, who published an account of this meadow and its mounds.

M. C. MEIGS, U. S. A.

Washington, D. C., October 3, 1885.

Curious Effect of Vertical Wind Pressure upon a Tree.

One of the strangest of cyclone freaks is recorded by a correspondent of the Pittsburg *Despatch*. The scene of it is at Washington Court House, O., and concerns an "apple tree with long, spreading, heavy branches, perhaps extending to a height of twenty-five feet. It is a tree of perhaps twenty-five years' growth, and undoubtedly has roots as stout and almost as widespreading as its boughs. Its trunk is not less than fifteen inches in diameter; it was a thrifty, vigorous tree without an unsound branch, and the family have for years driven their high top buggy beneath its branches, for it shades the driveway into the yard. A short and stubby man cannot now walk under it without ducking his head. Does the reader imagine that it was uprooted? That might, indeed, seem possible, but it is not true. Without breaking so much as a twig of its foliage, the atmosphere drove that tree right down two and a half or three feet into the ground. The hole enlarged about the base of the tree as it now stands shows how much larger is the base that has been forced beneath the surface."

Infringement of a Design Patent.

In an action brought for the infringement of a patent for a design for carpets, no profits were found to have been made by the defendant, but the Circuit Court in which the action was tried allowed to the plaintiff as damages for every yard of carpets made upon the design in question a sum equal to the profit made by the plaintiff in making and selling carpets with the patented design. The Supreme Court of the United States held that this award of damages was improper, and that only nominal damages should be allowed, there being no evidence as to the value imparted to the carpet by the design. Dobson *vs.* Hartford Carpet Company.

Notes on Natural Gas.

J. M. Guffey & Co. struck a big vein of gas at their well on the farm of S. F. Dunn, in the Murraysville district, on the 25th of July. Work was commenced six weeks previous, and the gas sand found at a depth of 1,630 feet. Prof. Edward Orton, State Geologist of Ohio, made two measurements of the product of the well, and gave the following as the result: "My preliminary estimate makes the output near 75,000,000 cubic feet per day, or an equivalent in heating power of from 150,000 to 200,000 bushels of coal.

The gas well drilled by Gunning & Lind at Madison, O., was commenced on the 29th of June. The first vein of gas was struck July 14, at a depth of 780 feet. It has since been drilled a total depth of 1,025 feet, and is said to have a pressure of 100 pounds to the square inch.

The Pittsburg, Virginia & Charlestown Railroad Co. have refused the Acme Gas Co. the right to lay pipe under their track at Homestead, and a large force of men have been placed on duty to prevent the gas company making the attempt.

William Laney, a Bradford contractor, is drilling a well for natural gas for a Cleveland rolling mill. In drilling the well to the depth of 2,000 feet, they have passed through three veins of salt having an aggregate thickness of 250 feet. One of the salt veins has a thickness of 164 feet.

The Shenango Natural Gas Co., organized with a capital stock of $350,000, for the purpose of bringing gas to New Castle, are drilling for the vapor in the western tier of townships in Butler County. Up to August 15 they have completed two dry holes and two gas wells, and are now drilling two more wells. The wells which they have drilled are from ten to seventeen miles east of New Castle. In this section they find the gas in the regular Butler County gas sand, and about 1,200 feet below the limestone which serves as a basis from which depths are calculated in drilling operations in this county. The Shenango Gas Co. will lay altogether 25 miles of 10 inch, 8 inch, and 6 inch gas pipe from their wells to New Castle this year. Phillips Bros. are drilling a well in the second tier of towns from the west line of Butler County.

Contracts have been made to drill a well for natural gas at Toledo, Ohio.

A charter has been granted to the People's Natural Gas Company, Pittsburg.

The Richards & Hartley Glass Company have completed another good gasser at Bull Creek.

A fair gas well was struck at Bethel Station, Ohio, on the B. Z. & C. R. R., July 6, at a depth of 1,100 feet.

The Bridgewater Gas Co.'s fifth well was completed August 12, near Rochester, in Beaver County. It is the largest well yet struck by that company.

Gas was struck in an artesian well which was being bored near Hoffman's brewery, Cincinnati, on the 21st of June. The owner claims it will save them $1,500 a month in fuel. Some excitement prevails over the discovery.

The Allegheny Poor Board has accepted the proposition of the Philadelphia Natural Gas Company to supply the buildings on the City farm with natural gas during the ensuing year for $1,300. The cost of coal at the farm last year was $1,800.

Charters have been issued to the Manufacturers' Natural Gas Company, of Pittsburg; capital $30,000; Canonsburg Light and Fuel Company, of Washington County, capital $20,000.

The Natural Gas Company, of Petrolia, Pa., announces that it is ready to supply the citizens of that place with gas at the rate of two dollars per month for each fire in dwelling houses.

The estimated value of the natural gas used in the United States in 1884, was $1,460,000, as against $475,000 in 1883. The value is computed from that of the coal superseded by natural gas.

While boring for water in the vicinity of Clinton, Illinois, a vein of natural gas was struck at a depth of ninety feet. The quality has been demonstrated to be good. Steps are taking to utilize the discovery.

Natural gas was struck at Port Colborne, Ontario, at a depth of 420 feet. The force is sufficient to light up the town, and on August 11 the well was tubed and its product run into the gas mains of the town.

The Hite Natural Gas Company, of Pittsburg, organized by P. Y. Hite and S. M. Ross, are laying pipe to Sharpsburg. The paid-up capital of the company is said to be $250,000. The estimated cost of the line is between $300,000 and $400,000.

The second well of the National Tube Works Co., of McKeesport, was struck at Murraysville, on the 7th inst. The flow is unusually strong, and it sends forth its volume of gas with a tremendous roar, which can be heard above the noise of the other wells in that locality.

The East End gas district, in Pittsburg, is failing. To-day but five wells produce gas that is worth gathering. They are Westinghouse No. 1, the first struck, No. 2, No. 5, No. 6, and the well at the Brace Laundry. The total amount produced by all is comparatively insignificant. In one day they do not produce as much as the Westinghouse No. 1 did during its first month in one-half hour. Insignificant as it appears when compared with the great well, the amount is still enough to supply, through the Philadelphia company, 150 houses and a half dozen works in the East End. It is now little over a year since the territory was thought to be the richest gas field in the world, yet during that time it has virtually been exhausted. The supposition is that the Westinghouse No. 1 dipped into a "pocket" of gas, the like of which may never be discovered again.—*Petroleum Age.*

New Products of Sevres Manufacture.

One of the most remarkable exhibits that is to be seen at the Exposition of Decorative Art at the Palace of Industry is undoubtedly that of the Sevres manufactory, in which are to be found numerous specimens of beautiful porcelains due to the new processes of Mr. Lauth, regarding which different judgments have been pronounced.

In an interesting lecture last week the learned director of the Sevres factory described the present state of the porcelain industry, which is one that our country ought to feel proud of. For our part, we unreservedly admire the new products, and we believe it our duty to give herewith some information on this subject, in order to show the difference that exists between the old hard paste of Sevres and the new.

When the first researches were made on hard porcelain, there was taken as a model the porcelain of China which the Portugese had imported into Europe. After long researches, manufacturers at Meissen, in Saxony, succeeded in making a product that was nearly similar, to judge by external appearance; but from the standpoint of decoration it was soon seen that the Meissen porcelain, as well as all other hard ones of Europe, could not be ornamented with enamels in relief after the manner of those of the East. They could only be painted with colors laid on in extremely thin coats, and the colors often remained dull, and never reached the brilliancy of the enamels employed by the Orientals. When an endeavor was made to fix enamels upon the hard porcelains of Europe, no success was obtained, since there was such a want of affinity between the groundwork and the enamel that the latter scaled off and removed the glazed surface with it, and this too to a greater degree with the Sevres hard paste than with any other. Deprived of this method of decorating with enamels, which permits of modeling the most brilliant subjects in relief, Sevres had to be content with the substitute that was found in colored pastes. These latter are capable of forming reliefs, but they have neither the transparency nor brilliancy of enamels, since pastes are essentially opaque.

The desire to have a porcelain paste fitted for decoration had existed at the Sevres manufactory for a long time when Mr. Lauth was appointed its director. In 1850 Ebelmen and Salvetat had undertaken some researches in this direction, but did not get satisfactory results. In 1875 the committee on the improving of Sevres ware got the manufactory to resume its researches concerning a paste that should take enamels. The problem was not yet solved, and no advance, even, had been made when Mr. Lauth, in 1879, with the collaboration of Mr. Vogt, took it up. These learned chemists were fortunate in their researches, and in less than a year they began the manufacture of a paste at Sevres which allowed of all kinds of decoration of the old hard porcelains, and also of Oriental ones. In short, the paste that Mr. Lauth has begun the manufacture of is a hard one, and more like the Oriental porcelain which an endeavor was made to imitate when the old hard porcelain was manufactured. The elements that enter into hard porcelain, both the old and new, are the same as those that were learned from the Chinese—kaolin and petunse.

Mr. Lauth, in concluding his lecture, fully satisfied those who had raised various objections to the new porcelain of which he is the inventor. It is in no wise the intention, said he, to substitute it for hard paste (which is so valuable, so beautiful, and in so much repute), since the latter possesses qualities of solidity that no other porcelain can equal for daily domestic use; but he only intends to employ his new processes at Sevres, along with the manufacture of the old hard paste, for the production of exclusively decorative objects, such as are created solely for the delectation of the eye, since these processes allow artists to use a complete palette of very beautiful enamels that have much analogy with those of the East. —*La Nature.*

Light Waves of Increased Length.

At the recent meeting of the American Association, Prof. Langley showed that in addition to the wave lengths in and beyond the visible spectrum, he has detected, by means of the bolometer, vibrations of much greater wave length than have heretofore been known, being several octaves below the red end of the spectrum, thus extending the range of recognized vibrations to between six and a half and seven octaves, including the one octave of visible rays. This delicate instrument has enabled him to detect heat radiation from objects of as low a temperature as —2° Cent.

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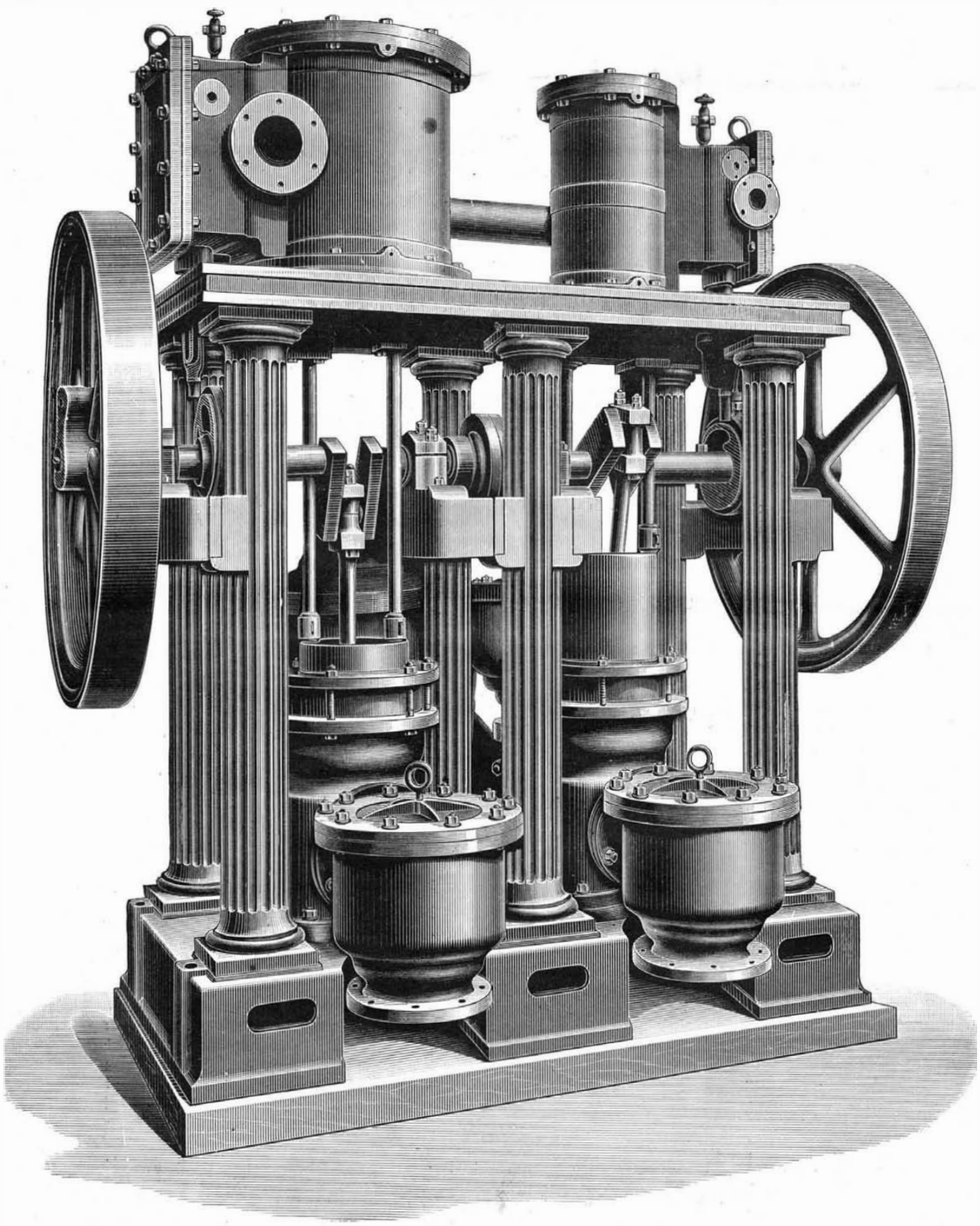
IMPROVED PUMPING ENGINE.

We give below a perspective view of a pumping engine recently put down at the water works, Northwich, Cheshire, for the purpose of supplying the whole of the town with the necessary water. The engine was constructed by Mr. John Wolstenholme, of Radcliffe, Lancashire, and the high and low pressure cylinders are 14 inches and 24 inches in diameter respectively, with a stroke of 15 inches, and are provided with pistons on Mather and Platt's principle, with weldless steel coils and cast iron casing rings. The piston rods (of Bessemer steel), two to each cylinder (working through stuffing glands), are fitted direct into the rams, preparation being made on the outer edges of the rams (which are cast hollow with open tops), and bored to receive the rods. The rods are afterward cottered up, and have wrought iron bushes on top with taper steel cotters, which tighten up the cotters in rams and allow them to be taken out at any time with ease. The rams and pump barrels (14 inches bore) were cast vertically in dry sand moulds.

The preparations for connecting rods are a few inches from the bottom of each ram, and are bored and fitted with steel pins; the connecting rods are thus longer than is usual in this class of pump, and intermediate bows, etc., are dispensed with. The crank ends of the connecting rods are provided with gun metal marine steps, wrought iron plates, turned bolts, nuts, and lock nuts, the opposite ends being cut out of the solid and having gun metal steps, round and square, with taper cotter chased at top side, and having nuts and lock nuts for adjusting.

The cranks are of crucible cast steel, 4½ inches in diameter, and with a flanged coupling connecting the two, so that either pump may at any time be disconnected. Each crankshaft has two journals 4 inches in diameter, and straight pedestals with caps and double gun metal steps carried by fenders bolted on the sides of the pillars. The slide valves are of the ordinary flat kind, working in boxes cast with the cylinders and having Bessemer steel spindles.

The pump valves are of a tough rubber, working over grated seatings, under mushroom shaped guards, the valve boxes having a large area for the water. The suctions are separate (10 inch pipes), and the delivery valve boxes are connected together by a breeches pipe and delivered into a 14 inch pipe. The suction is from adjacent filter beds, and the delivery is up an incline 300 feet long and 25 feet high to the bottom of the water tower, and thence up the tower 85 feet high. The engines are calculated to deliver 50,000 gallons per hour when in ordinary work. The pipes are arranged that the pumps may deliver either on the top of the tower or deliver past the tower to supply the town direct.—*Engineering.*



IMPROVED COMPOUND PUMPING ENGINE.

UPON a slip of glass, says D. G. Doane in the *Microscopist*, put a drop of liquid auric chloride or argentic nitrate, with half a grain of metallic zinc in the auric chloride, and copper in the silver. A growth of exquisite gold and silver ferns will grow beneath the eye.

Is Hay Cheap Food?

Most dairymen suppose that hay is the cheapest food for their cows, and think it a misfortune to be short of hay—which is, in a sense, true, for every one should try to produce all the hay required for his stock—but it is seldom true that the market price of grain is higher than hay. If we consider the relative nutritive value of hay and grain, or product of grain, we find that good meadow hay or clover is no cheaper at $13 or $14 per ton than good wheat bran or middlings is at $20 or $21 per ton, or corn meal at $22 or $23 per ton, or linseed cake or meal at $32 or $33 per ton. Now, this does not mean that corn meal, middlings, or oil meal would be just as appropriate for the complete food of a cow as hay. We know that such concentrated food would be quite dangerous to feed a cow without some coarse fodder; but it means that the nutriment in these foods will be as cheap to make up any deficiency in the ration, at those prices, as hay at the price mentioned.

Therefore, when hay is dear in the dairy districts, instead of buying hay the dairymen should buy grain in some form to help him out. The grain will be cheapest, and his cows come through in much better condition for the milking season than if they had all the good hay they could eat. All a cow requires over twelve or fifteen pounds of hay should be made up in grain food. Twelve pounds of hay and eight pounds of middlings per day will winter a thousand pound cow much better than thirty pounds of hay per day. But the ground feed should be mixed with cut hay, moistened, so the ground feed will adhere to it, and must be eaten with the hay and raised, and remasticated. Fine feed, fed alone, is not raised and remasticated, but goes on to the fourth stomach, without further mastication.—*National Live Stock Journal.*

Electricity from Fire.

At the International Inventions Exhibition, Mr. J. A. Kendall, of North Ormsby, Middlesborough, exhibits an electric battery which appears to be a decided step in the direction of producing electricity from the oxidation of coal without the intervention of a steam engine. The battery is, says the *Engineer*, based upon the well known phenomenon of hydrogen passing through platinum at a red heat, two platinum plates being used as the poles, one exposed to hydrogen and the other to oxygen. These plates are arranged in the form of concentric tubes closed at one end, and are separated by a fluid medium of fused glass. Hydrogen gas is continuously supplied to the inner platinum tube, while the entire apparatus is maintained at a high temperature by means of a furnace fed with coke or liquid or gaseous fuel. The absorption of hydrogen by the platinum is accompanied by electric generation, and the current is led away by wires connected with the platinum tubes. It is curious, however, that so long as the two platinum tubes are not connected by a metallic circuit, the passage of the hydrogen is slow, but that, as soon as the electric circuit is completed, the rate of flow is suddenly increased and is steadily maintained at the higher amount. In the case of a group of cells or battery, the same gas furnace may be used to heat the series. The cells are connected for quantity and intensity as in the voltaic battery. The electromotive force of a cell is given by Mr. Kendall as about 0·7 volt. This is, of course, much less than the theoretical electromotive force of a hydrogen and oxygen couple, and the remaining energy evolved by the combination appears to be developed in the form of heat at the surface of the oxygen plate, and serves to keep up the temperature of the apparatus. In the action of the battery, the hydrogeu in passing through the inner tube is, so to speak, filtered off from any gases with which it may be mixed. The residual combustible gases, if any, when drawn off by the escape jet, can be utilized as fuel for the furnace. This is a very valuable feature, as it enables the battery to be worked with Strong producer gas, consisting mainly of hydrogen and carbonic oxide, and to be arranged in a very compact way, the spare heat left from heating the cells being available for working the producer. Mr. Kendall proposes to employ it for a variety of purposes—for example, the driving of electric launches, and so on. With the new generator, all that is required to maintain the working is a supply of fuel and a little water. The inventor estimates that a ton of coke used in heating the battery, including the hydrogen producer, will give at least three times the electrical energy that would be produced by the same quantity of coke used in working a steam engine and dynamo. It is also hoped by the inventor to develop the new process of electric generation for lighting purposes. Houses can in this way be lighted by incandescent lamps by means of coal gas supplied to the premises; and larger centers of illumination could be economically worked by the use of ordinary fuel, such as coal and coke.

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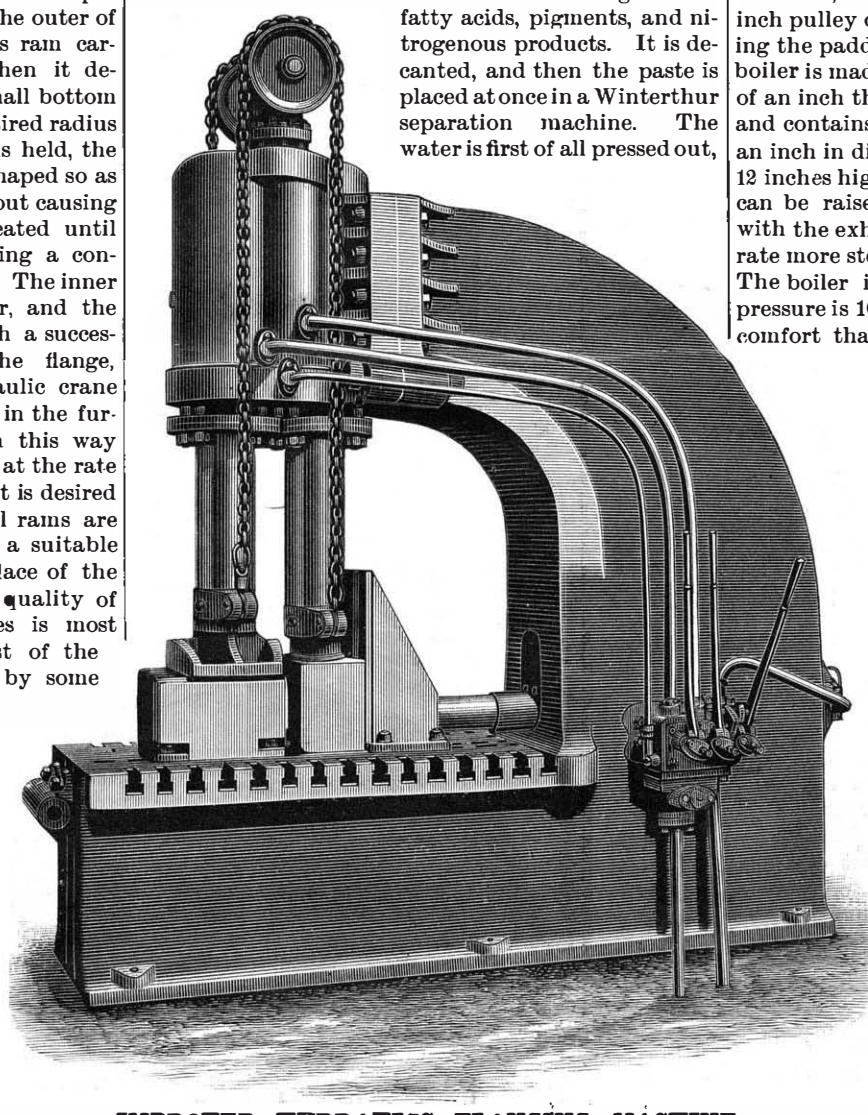
HYDRAULIC FLANGING MACHINE.

In this machine, instead of the whole plate being flanged in one operation, a progressive action is adopted; in fact, by the combined action of three hydraulic cylinders, the action of hand flanging is very closely imitated. The mode of working is extremely simple. When flanging the outer edges of circular boiler fronts, the plate is centered on a pin so as to bring the edge under the ram of the outer of the two vertical hydraulic cylinders. This ram carries a closing or nipping block, which when it descends holds the plate firmly against the small bottom block or die, which is formed to suit the desired radius or curve of flange. While the plate is thus held, the inner ram descends, the tool on it being shaped so as to turn over the edge of the plate without causing undue stress, these operations being repeated until about 8 feet or 9 feet of flanging—this being a convenient length to heat at one time—is done. The inner ram is then withdrawn into its cylinder, and the horizontal ram brought forward. This, with a succession of short rapid strokes, squares up the flange, and the plate is then lifted by a hydraulic crane placed above the machine, and deposited in the furnace for another length to be heated. In this way flanges 8 inches to 9 inches deep are finished at the rate of 90 feet to 100 feet in nine hours. When it is desired to flange furnace mouths, the two vertical rams are coupled together by a block or die, and a suitable mould substituted in the bed plate in place of the blocks used in flanging the edges. The quality of the work turned out by these machines is most excellent, and they are now used by most of the leading marine boiler makers, as well as by some of the large steel companies. In general terms, it has been stated by a large user that such work as steel boiler fronts with flanges 7 inches to 8 inches deep is flanged at four times the speed and at one-sixth the cost of hand work. When it comes to 9 inch or 10 inch flanges, hand work is, of course, out of the question. In flanging dome ends and similar work, the machine will do five times as much work in the same time at one-seventh the cost. All the flanges for from sixty to seventy large boilers per annum can be made with one machine, assisted with three ordinary fires for odd flanging. It should be added, however, that this is not the only saving, since the putting together of the boiler is much facilitated by the accuracy of the various parts when flanged in dies by hydraulic pressure. This machine is made by Fielding and Platt, Gloucester, Eng., and is, says the *Engineer*, one of the exhibits at the London Inventions Exhibition.



IMPROVED HYDRAULIC FLANGING MACHINE.

A Life Saving Canal Horse.

A correspondent of the New York *Sun*, writing from Creek Lock, N. Y., October 16, says: Barney Dugan's canal horse Old Joe has saved two persons from drowning within the past three weeks. The first rescue was that of a girl named Annie Ginley. She was playing on her father's boat at Big Basin. As Dugan's boat and Old Joe came along, the girl fell into the canal. Before any other aid could be given to her the horse plunged into the water, seized the girl's dress in his teeth, swam with her clear across the basin, where the bank was low, and clambered out with her. He refused to swim back, and had to be taken from the tow line and driven a mile back to a bridge.

The second rescue was that of the boy who drives him on the canal. The boy was wrestling yesterday with another boat boy on the tow path, and was thrown into the canal. He couldn't swim, and there was no one near him who could. While a boatman was looking for a pike pole, Old Joe jumped into the canal and brought the boy safely back to the tow path.

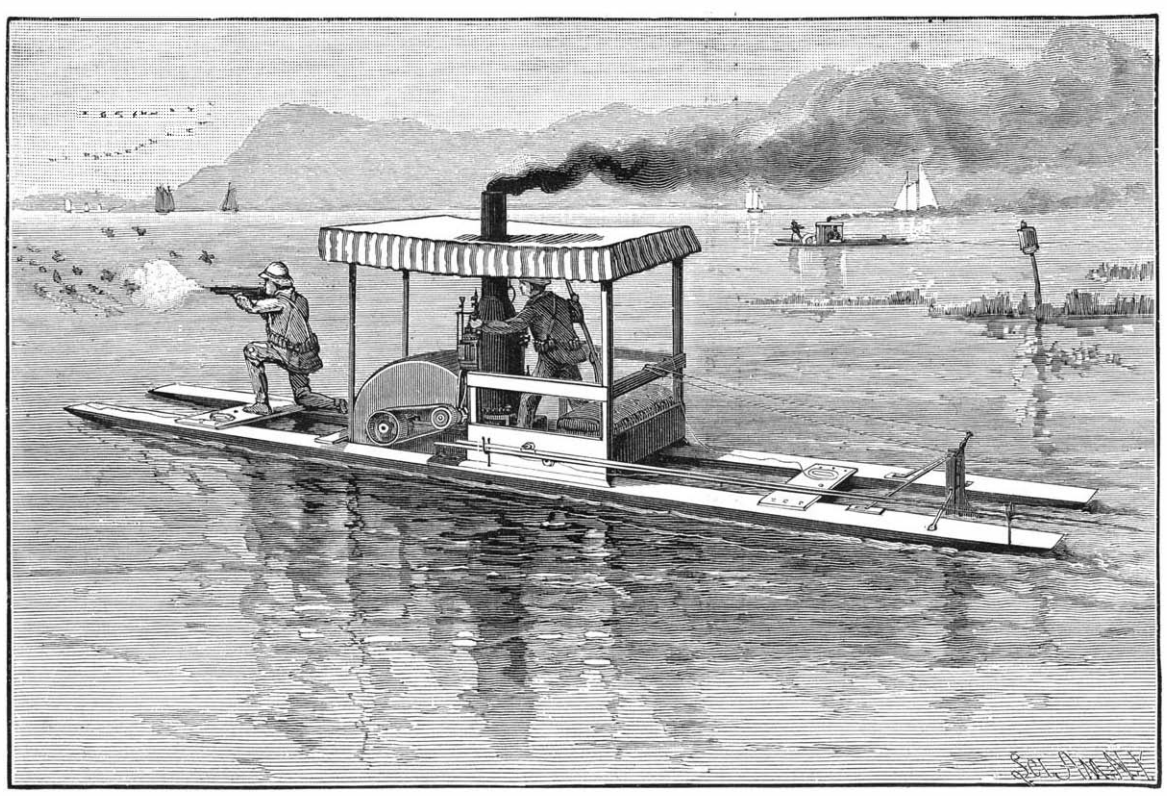
FANCY baskets are made of the pulp of wood which are superior in every respect to those made of any of the ordinary materials now used. They are light, strong, and handsome. And they are bound to become the ladies' favorite work baskets. What next? Trunks, we suppose, will next take the field. And why not?

Extraction of Soap.

According to Professor Lunge, about 55 to 60 per cent of the fatty acid originally contained in the soap are now recovered in the Swiss works out of the waste soap liquors, which, in former time, were allowed to run away without utilization. The waste soap baths are treated with sulphuric acid, when a pasty precipitate is formed consisting of the fatty acids, pigments, and nitrogenous products. It is decanted, and then the paste is placed at once in a Winterthur separation machine. The water is first of all pressed out, then the pressure is increased while heat is applied at the same time, finally the remaining mass is extracted with bisulphide of carbon or petroleum spirit. The fatty acids obtained are of good appearance, and, of course, can be used again in the manufacture of soap.

STEAM CATAMARAN.

The steam catamaran shown in the accompanying engraving is designed to be used in shoal water where propeller boats could not run; it is 26 feet long by 4 feet wide over all. Each hull is 10 inches wide by 8 inches deep, and has five watertight compartments, or ten in all. The hulls are put together entirely with screws and bolts, thus making a strong and safe life-preserver that will hold weight according to capacity, whether right side or bottom side up. Another important advantage gained by this method of construction is the stiffness—a person stepping from one side to the other hardly changes the position of the hulls.



STEAM CATAMARAN.

The paddle wheel, placed near the center, is 24 inches in diameter, and has four buckets, each 3 by 24 inches. The wheel shaft is hung in bearings, which can be raised or lowered so as to take more or less water against the buckets, or can be raised clear of the water when it is desired to use a sail. The steam cylinder is 2 by 3 inches. The pulley on the engine shaft is 5 inches in diameter, and carries a 3 inch belt, passing over a 14 inch pulley on the paddle wheel shaft. A box inclosing the paddle wheel keeps all the machinery dry. The boiler is made of the best steel, and is three-sixteenths of an inch thick, 14 inches in diameter, 24 inches high, and contains 80 seamless brass tubes, three-fourths of an inch in diameter by 12 inches long. The firebox is 12 inches high, with one-half inch water space. Steam can be raised from cold water in nine minutes, and with the exhaust entering the stack the boiler will generate more steam than can get through the cylinder. The boiler is tested to 200 pounds, and the working pressure is 100 pounds. This craft is shaped more for comfort than high speed, but the manufacturer, Mr. Geo. F. Shedd, of Waltham, Mass., proposes to construct the next one so as to combine both.

Naphthalene as a Wood Preservative.

One of the exhibits in the Mining Exhibition at Glasgow is the naphthalene process for preserving timber, as patented by Mr. Henry Aitken, of Falkirk. The *Journal of Gas Lighting* says: The process is not only ingenious and apparently effective, but is noteworthy as offering a useful application for one of the most embarrassing residuals of gas manufacture. Even as purchasable from tar distillers, naphthalene is cheap for this purpose. The inventor claims many advantages for his process as compared with any other device for the protection of timber from decay. Among others, it is stated that wood to be preserved in this way may be treated while green and unseasoned, and may afterward be painted and varnished, neither of which observations applies to the creosote process. Of course, the test of a wood preserving process is time; and in this case only four years have elapsed since the process has been placed upon trial. During this period, however, not the slightest sign of decay has shown itself, either in the poorest description of white wood fencing treated by this system or in timbers placed below ground, where dry rot attacks the best seasoned timber, and renders it worthless in from three to four years. As an experiment, three years ago, timber from the wet log has been naphthalened, and made up into three railway wagons for the North British Railway, and these wagons have been running ever since without the slightest change. The plant required is said to be inexpensive, and the process is easily worked. The naphthalene is melted in a vessel capable of being tightly sealed, and the wood is laid in it, remaining until experience shows that the saturation is complete. The temperature at which timber is treated is kept as low as possible, so as not to injure the fiber. For firs and pines the naphthalene may be heated to 190° or 200° Fah.; but for oak and hard woods in general a temperature of 180° to 190° Fah. is sufficient. Vacuum and pressure may be employed in naphthalening as in creosoting; but so far as experience goes, neither is necessary. Seasoned wood may be naphthalened without losing its hardness or color by placing it in a solution of naphthalene in spirit under pressure. When withdrawn, the spirit evaporates, leaving the naphthalene in the wood. Wood may, if desired, be partially treated by exposure to naphthalene vapor. The action of the naphthalene is to destroy all albuminoid compounds in the wood, leaving it dry and clean to handle, and with only a faint aromatic smell.

TO REMOVE DANDRUFF.—Take of borax one drachm, rose water one-half pint, tincture of cantharides one-half drachm, cologne water one-half pint. Mix, and apply night and morning.

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Practical Hints on House Building.

In one of our exchanges we find the following useful suggestions on the alteration of old houses or construction of new ones. We do not know if the hints here given are those of an architect or of some practical housewife, but the advice is none the less useful whether they emanate from the practical woman or the professional architect.

In most cases a house should be so planned, built, and placed as to afford facilities for enlargement, and without making a thoroughfare of any old room to get to the new part of the house.

For a country house, a porch is desirable, almost essential, and big enough for children to play on, and to swing a hammock in.

If you can't have a dry cellar, don't have any, but build your house on the ground level, on a concrete bed. Cellars can be made dry by concreting floor and walls, and by giving the floor an inclination toward a drain in one corner. A trough-shaped gutter may be run in the concrete when fresh, so as to make an admirable water course for any water that may get in by bursting water pipes or from floods. The cellar should be as light as you can make it. Dark cellars get damp and dirty. Light ones are apt to be dry, clean, and sweet.

If you are going to have water pipes throughout the house, see that you have plenty of water clear up to the top, for cleanliness and for use in case of fire. An upstairs sink, where scrub water can be drawn and discharged, saves many a step and tends to keep things clean.

All the rooms on the floor should be of the same level. This up-a-step and down-a-step business is a nuisance.

Many a small house is spoiled through not having enough hall room—no place to put a hat rack or the baby carriage or lots of other things which take up room, and which do get put in a hall or an entry where there is one.

It would be a very handy thing if at least one dimension of each room was an even number of carpet widths. Carpet comes either twenty-seven or thirty-six inches wide, and rooms can generally be multiples of at least one of these dimensions.

The parlor may be more nearly square than the dining room. It should, if possible, be so planned as to leave room for a square piano against an inside wall. A piano placed against an outside wall gets out of tune, and changes with the outside temperature.

The dining room should be considerably longer than it is wide. If you have to "skimp" on the size of your dining room, you had better shave off the width of it and arrange for room lengthwise. The room must be wide enough for a four foot table and guests on each side, and passage way behind the guests; that is, a fixed width, no matter how many are sitting down to the table; but the table has to be lengthened to accommodate the guests, and there should be lengthwise room.

A square kitchen seems the handiest to the housewife, and her ideas should be consulted—and carried out—as to this room, if as to no other. Don't "skimp" the kitchen as to size. A summer kitchen, even if it is only a shed, will help keep the house warm in winter and cool in summer. A kitchen store room, where the women folks can keep many of their supplies, and save themselves the time and trouble of going down cellar or up attic, will be a daily blessing in most families. A butler's pantry or china closet between kitchen and dining room is a good investment if you can afford it. Plenty of expensive houses are built without it, and would be better with it.

The bath room should be accessible without having to pass through any other room. It is well to have it communicate with one of the bedrooms, or better yet with one on each side, but there should be one door opening into an entry.

Set it down that winding stairs are an expensive, inconvenient, dangerous, and inartistic arrangement. Straight flights are equally dangerous and more inartistic. Flights with right-angled turns at landing ways give a fine effect and do not trip one up, and children cannot fall far when they start from the top. Where there are little children or very old people, "halved steps" are good things, that is, the staircase is composed of two separate stairways, each half the width, each having full height of riser, but the treads arranged so as to alternate or break joint. A child or very old person, instead of having to take seven inch steps, can walk up the center of the flight with the right foot on the right hand set and the left foot on the left hand set, and take only three and one-half inch steps; or two persons can pass each other, each taking the regulation steps. This is not theoretical, but is a good thing which is in actual use in some old English houses.

Communicating rooms are a great convenience in most families. It is very easy to shut off the communication where it is not needed; but those houses where all the rooms are isolated, and open only into the halls, are about as inconvenient as those in which some of the rooms are of necessity thoroughfares.

A NEW INDIVIDUAL TELEPHONE CALL.

Our engraving illustrates the salient features of a new individual telephone call now in regular use in England, and recently introduced in this country. In this invention well known principles have been applied in a simple and effective manner.

A coil of wire, A, of not more than ten ohms resistance, is supported on a pivot, B, journaled in a frame, C, which also supports a horseshoe magnet, D, whose poles are surrounded by the coil, A. A pendulum, E, secured to a pivot, B, is weighted so as to have a period of oscillation different from any other in the same circuit. The pivot, B, supports a detent, upon which rests the free end of an arm, F. The coil, A, is in the line circuit, which is connected with the outside binding posts, and the lever, F, and the post, G, under it,

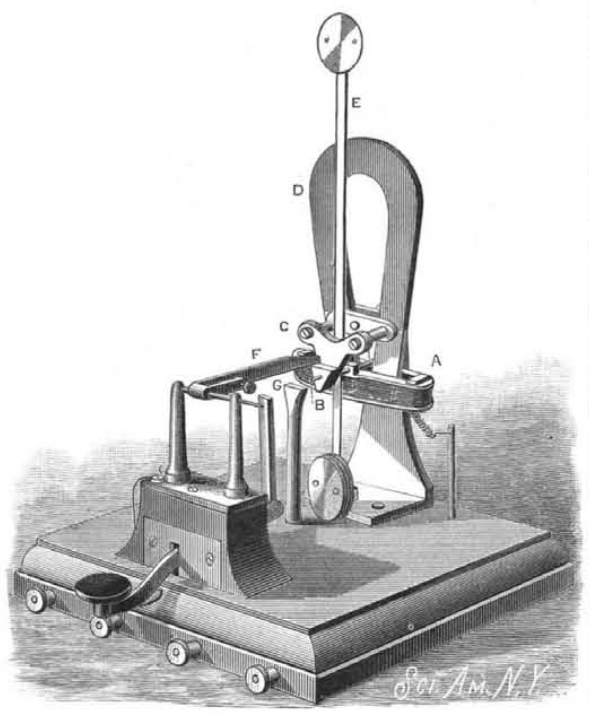

Fig. 1.—STEPHEN'S INDIVIDUAL TELEPHONE CALL.

form the terminals of a circuit connected with the inner binding posts.

It will be seen that, if an alternating current is sent over the telephone wire, the alternating positive and negative impulse traversing the coil, A, in times consonant with the period of the pendulum, E, the pendulum will begin to oscillate, and the swing will increase until its amplitude is so great as to turn the detent on the end of the pivot, B, sufficiently to liberate the lever, F, and allow it to drop on the post, G, and complete the local circuit, ringing the bell, or giving other audible or visible signal. After the signal has been given, the lever, F, may be replaced in its position on the detent by means of the key projecting from the front of the instrument.

The current may be sent by hand, taking the time by the swing of the pendulum adjusted to the instrument which it is desired to actuate; or an electrical impulse may be transmitted automatically by pendulum or metronome, the bob of which can be readily adjusted so as to influence any particular instrument on the line. It will be seen by reference to Fig. 2 that normally the electro-dynamic coils alone are in the circuit.

An addition to the instrument, which is not shown,

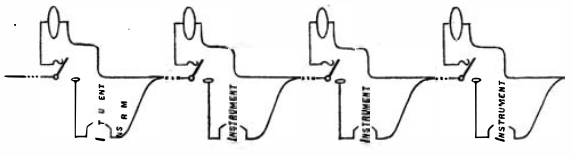

Fig. 2.—CIRCUIT OF STEPHEN'S INDIVIDUAL TELEPHONE CALL.

renders it impossible for one subscriber to listen to the message being transmitted to another.

By means of this simple instrument a small town at a considerable distance from a large telephone center could secure connection with the system by means of one wire, without any expense whatever for a central office.

These instruments have been set up at the establishment of L. G. Tillotson & Co., No. 8 Dey Street, New York city, where they may be seen by appointment with Mr. Alfred J. Faulding, at the same address.

CAPTAIN HANSON, of the bark Pauline, from Cardiff, at Quebec, recounts a strange phenomenon. In latitude 55 degrees north, longitude 46 degrees west, on September 20, during a rainstorm, a brilliant ball of fire lodged on the deck, and for a few minutes played about from the cabin to the forecastle, prostrating the captain and two seamen. With a loud report the fiery visitor disappeared as suddenly as it appeared, without damaging the vessel

CAN THE TEMPERATURE OF THE ATLANTIC STATES BE CHANGED?

The changes in our climate are often discussed, but it is probable that the possibility of our being able to cause a radical change in the temperature of any part of the earth is scarcely ever considered.

The first time the reader examined a globe or map, and followed the isothermal line on either side of the Atlantic Ocean, he was, no doubt, surprised to find that New York city, Madrid, and the Isles of Greece are about the same latitude, while frozen Labrador, England, and the "Evergreen Isle" are about equidistant from the equator.

Now, we understand the reason of this difference in temperature on the same parallel is to be found in the Gulf Stream, which, passing through the Straits of Florida, and bathing the shores of the British Islands, clothes their shores with perennial verdure.

The Gulf Stream in its course passes by Cape Hatteras at a distance of about thirty miles, by New York at a distance of about two hundred and forty miles, crosses the Grand Banks below Newfoundland at a varying distance from Newfoundland, depending upon the season—the stream in the spring and winter being forced about five degrees to the southward and eastward by the cold current from the north.

The question arises, Why has our coast no warmth from the tepid waters of the Gulf Stream? The reason is that we have the cold waters from the Polar Sea between us and the Gulf Stream. This fact is as fully conceded as that the Gulf Stream exists. We quote from the "American Coast Pilot" an article by C. W. Redfield as follows:

"I have long since become satisfied that the current in question is neither more nor less than a direct continuation of the Polar or Labrador current, which bears southward the great stream of drift ice from Davis' Strait, and which in its progress to the lower latitudes is kept in constant proximity to the American coast. In collating the observations of the various navigators, we find reason to conclude that, in ordinary states of weather, this current may be traced from the coast of Newfoundland to Cape Hatteras, and perhaps to Florida."

From the sailing directions for the coast of North America, published in London, edition of 1876, in an article on "The Currents on the American Coast" we find the following: An Arctic current originates in the frozen regions near the North Pole and flows along the east coast of Greenland toward Cape Farewell; then a portion continues its progress southward toward Newfoundland. The Davis' Strait current runs southward, and being augmented on its course by the Hudson's Bay current, these cold polar waters coast the shore of Labrador, pass into the Strait of Belle Isle, and thence into the Gulf of St. Lawrence. This current, following the shores of Cape Breton Island, Nova Scotia, and toward Nantucket Island, and along the east coast of the United States, forming what is called the cold wall of the Gulf Stream, etc.

The current runs at the rate of about two knots per hour through the Strait, and for thirty to forty miles to the westward. The temperature of the water is often at the freezing point, and brings many icebergs into the Strait and conveys them miles up the St. Lawrence Gulf. Two hundred bergs have been counted at a single time amid the floating fields of ice in the Strait during the month of August. (*Vide* Blunt's "Coast Pilot," 1857, p. 70.)

Assuming this to be true, it appears that closing the Straits of Belle Isle would cut off this current, and make a great difference in the temperature of our coast from Cape Hatteras to Newfoundland. Nova Scotia would have a climate as mild as Cape May, and Block Island and Cape Cod become winter watering places.

The polar current would be kept out of the Gulf of St. Lawrence. Navigation would be open the season through. There would be no icebergs in August, and the harbor of St. John, Newfoundland, would not be closed by ice in June, as it was in the year 1813. (*Vide* Maury, "Physical Geography of the Sea," page 49.)

What effect closing the Strait of Belle Isle would have on the Gulf Stream after it passes the banks of Newfoundland is largely a matter of conjecture. We have the statement, on the authority of Lieut. Maury, that the Gulf Stream is five degrees south of its position in the fall and in the spring, and that it is then deflected by the Polar current. If all the water passing through the Strait met it at the same point as the other current, it might bear it still further to the south, and the great body of the Polar current run under the Gulf Stream, as it now does.

There is another hypothesis. We are told by Lieut. Maury that the Gulf Stream is moved at a point near Newfoundland by varying winds and currents a distance of over three hundred miles, "like a pennant in the breeze," as he describes it.

If the water now passing through the Straits of Belle Isle (a larger volume than all the water passing from rivers into the Atlantic Ocean, from Newfoundland to the Gulf of Mexico, including the St. Lawrence and the Mississippi river, impinges on the Gulf Stream at a point where it now has its greatest variation, it can-

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not but have an effect on that current. A part of it is now turned down to the Canary Islands and around the Saragossa Sea, returning back to the Capes of Florida. This portion of the Gulf Stream must be increased by a deflection of the main stream, and the supply of heat now furnished to the British Islands be diminished.

England, in that case, would have a temperature due to her latitude. It is easy to understand, that having a climate like Labrador would make many changes in the tight little island.

We can suppose the Queen, leaving her frozen subjects in England, might take the throne as the Empress in India, and we have the first chapter in that prophesied epoch which would bring the New Zealander to wonder what London once was.

We know that the temperature and climate of different portions of the earth have entirely changed since animal life first began on our globe, and the question arises if some of these changes are not under the control of man.

Can the Straits of Belle Isle be closed? In an engineering point of view, there is no difficulty. At the point where the barrier would be made, the Strait is about ten miles wide, and averaging one hundred and fifty feet deep. The material is at hand; the Strait is bordered by rocks from two hundred to a thousand feet high, and with this rock we would build the wall or dam. From our present knowledge of the depth of the Strait as obtained from the charts of the English Government, we can estimate that the cost of this barrier would not exceed forty million dollars, an expenditure that does not seem to be great in comparison with the benefits that would ensue.

Fig. 1 of the accompanying maps shows the Straits of Belle Isle, the Gulf of St. Lawrence, Newfoundland, and the northern part of Nova Scotia, with the location of the barrier herein suggested. Fig. 2 is a map of the North Atlantic showing the Gulf Stream (indicated by full lines, thus——) and the Polar or Labrador current (indicated by dot and dash, thus —.—.), which at present flows through the Straits of Belle Isle, and forms the "cold wall" along the coast of the United States.

JOHN C. GOODRIDGE, JR.

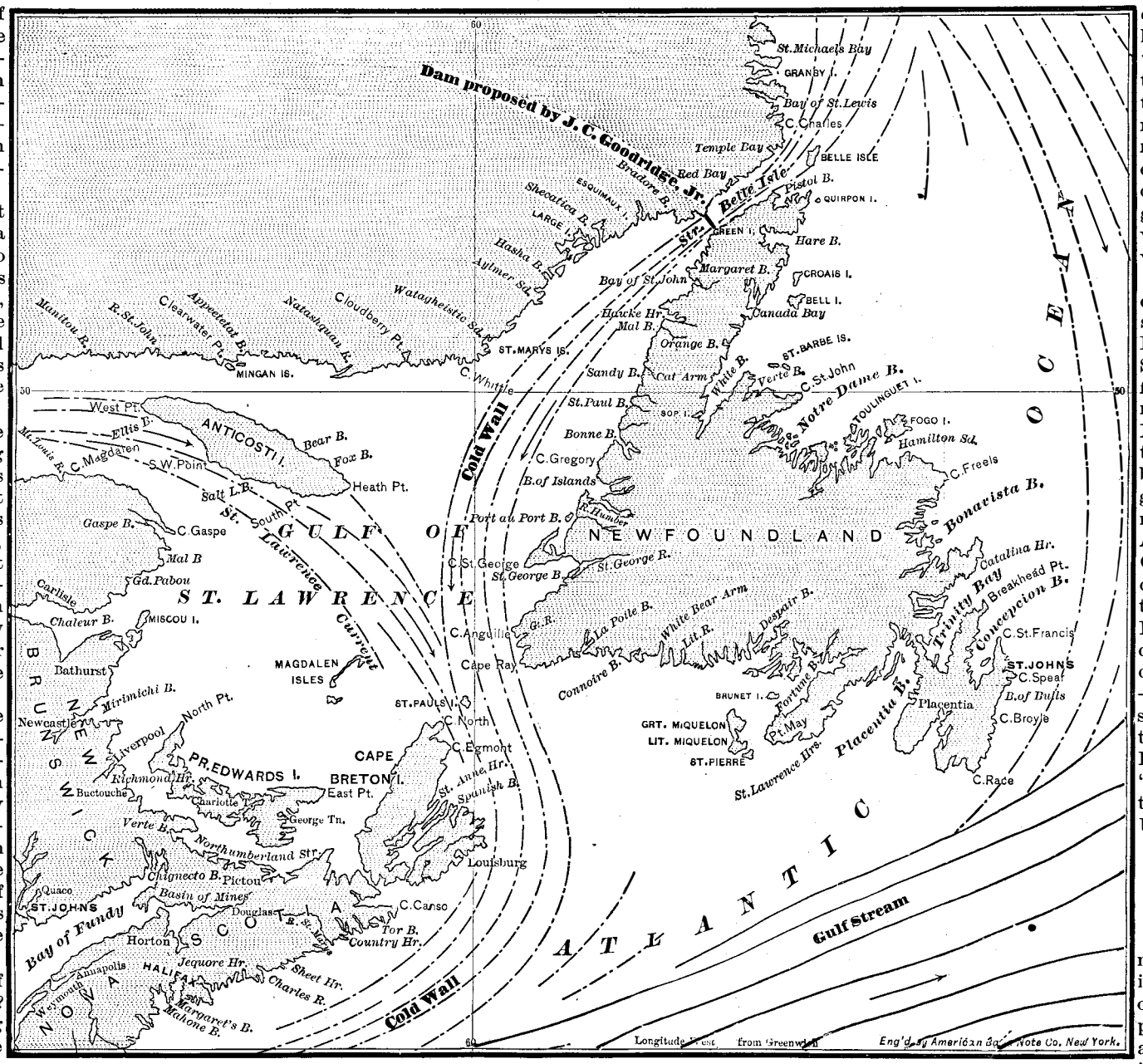

Fig. 1.—MAP OF STRAITS OF BELLE ISLE, GULF OF ST. LAWRENCE, AND NEWFOUNDLAND, SHOWING THE LOCATION OF THE DAM OR BARRIER PROPOSED BY MR. JOHN C. GOODRIDGE, JR.

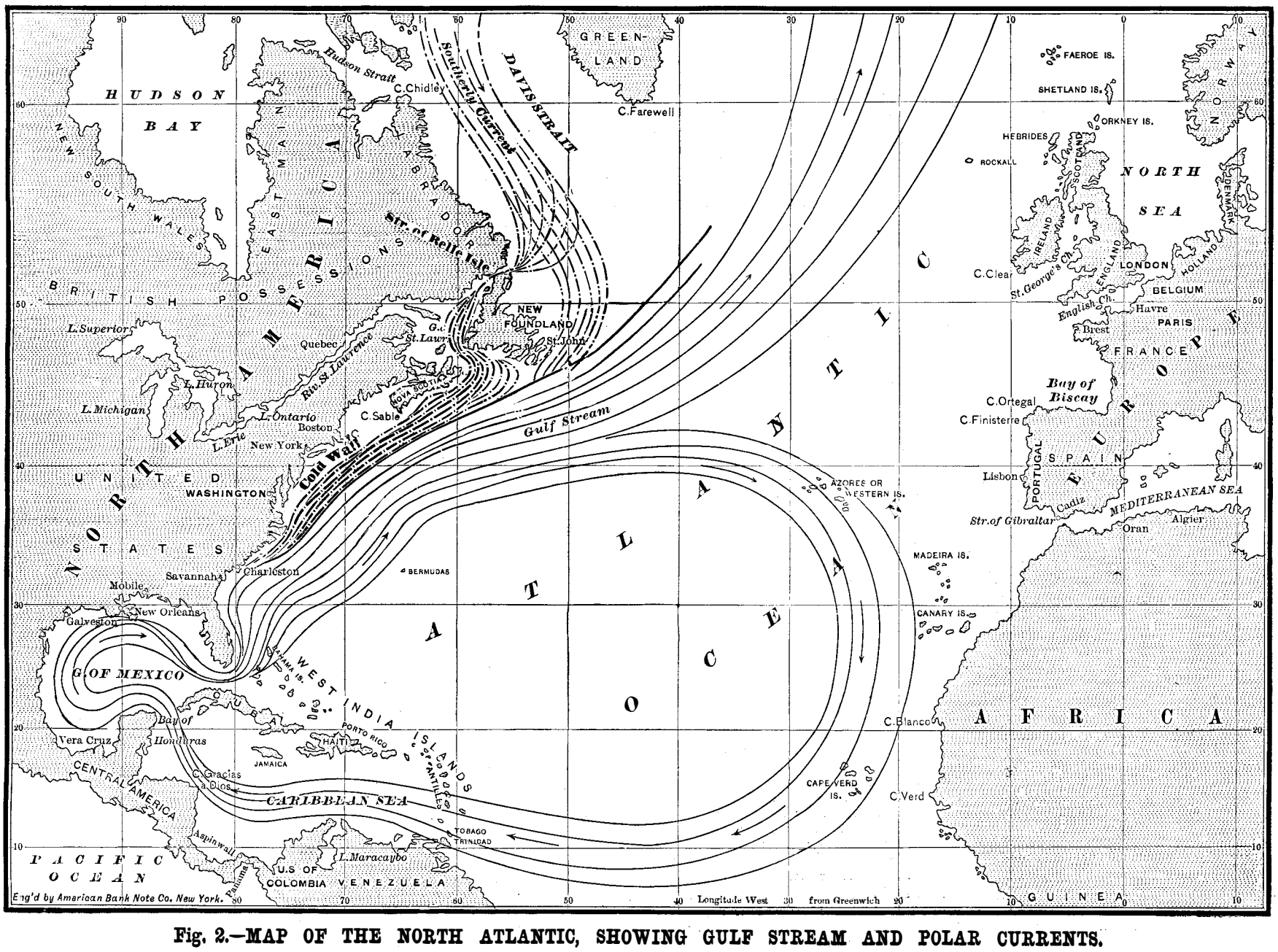

Fig. 2.—MAP OF THE NORTH ATLANTIC, SHOWING GULF STREAM AND POLAR CURRENTS.

Swedish Filter Paper.

ONLY the purest materials are used in the manofacture of Swedish filter paper. Its small amount of ash is its chief characteristic.

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ENGINEERING INVENTIONS.

A car axle box has been patented by Mr. Joseph Fischer, of Elizabeth, N. J. Combined with a journal box is a shaft, two rotary pumps, and a pulley, the device being so operated by the revolutions of the axle as to continually feed oil upon the journal.

A car coupling has been patented by Mr. John Cuneo, of Vicksburg, Miss. It has twin arms or jaws in approximately the same plane, with cross rod extending between them in the rear of their engaging portions, and one arm having a cam or wedge block arranged and operating close to the shoulder of the jaw end of the arm, with other novel features.

A car coupling has been patented by Mr. Lewis H. Shular, of Crawfordsville, Ind. The drawbar has suitable guides, and the forward end of the drawhead rests on a bent supporting plate for necessary side play as the car rounds curves, there being parts for link supporter and link adjuster, with other novel features, to facilitate the coupling of cars without requiring trainmen to stand between them.

A car coupling has been patented by Mr. Perry F. Randebaugh, of Florence, Kan. The drawhead has a hook with bolts for securing it, there is a depending link pivoted to the pin on which the hook is journaled, and there is an upper link pivoted in the rear end of the drawhead, with a lever for operating the same, the device being adapted for coupling or uncoupling cars from the top or either side.

AGRICULTURAL INVENTIONS.

A harvester has been patented by Mr. Frederick Laqua, of Thielmanton, Minn. The tongue is made in two sections, jointed, and so connected that the forward end of the harvester will be kept from rising too high or dropping too low, the construction being especially designed to take the weight off the horses' necks.

A planter has been patented by Mr. Robert J. Gardner, of Lovelady, Texas. Combined with a seed planter is a main frame having side beams, and a standard carrying a shovel with a presser in its rear, the hopper and planting mechanism being arranged to drop the seed directly in the furrow formed by the shovel and presser.

A cotton cultivator has been patented by Mr. James H. Fowles, of Orangeburg Court House, S. C. It is made to run directly over the seed furrow before or after the plants appear above the ground, breaking the crust and preventing grass from starting, and the cultivating teeth are held at all times projecting directly to the rear of the framing or carriage.

A plow has been patented by Messrs. George W. D. and Lawrence L. Porter, of Fayetteville, Tenn. This invention covers devices by which the standard and beam are so connected that the angle of the standard may be changed to adjust the plow as desired for the particular work being done, and the handles may also be adjusted to suit the convenience of the plowman.

A machine for packing soil beneath the surface has been patented by Mr. Benjamin F. Waggoner, of Litchfield, Ill. The frame is carried by several wheels, so arranged that each of them shall bear an equal weight, and they will be forced into the ground as the machine is drawn across a field, to pack the soil beneath the surface so that it will be firm enough to retain moisture and support the roots of plants.

MISCELLANEOUS INVENTIONS.

A writing pad cover has been patented by Mr. Gustave Hood, of Newark, N. J. This invention consists in the novel construction and combination of various parts, affording receptacles for envelopes, postal cards, pen holder, and pencil.

A shaving mug has been patented by Mr. Thomas Maylor, of Oak Harbor, Washington Ter. In this mug there is such an arrangement of lamp and water cup that the shaving water may be conveniently heated, while a lather cup is pivoted thereto.

A crayon and eraser holder for blackboards has been patented by Mr. Irving W. Barnhart, of Flint, Mich. Combined with a blackboard trough is a wire-netting or perforated piece held above its bottom, to hold the crayons and erasers, so they will not accumulate dust from the rubbing off of the board.

A wagon seat lock has been patented by Mr. Jared Blakeslee, of Story City, Iowa. The device is under the seat, and quite flat against its risers, so as to be out of the way of goods, and the heads of the lock studs, standing outside of the lock plates, serve to prevent the spreading of the sides of the wagon body.

A window ventilator has been patented by Mr. John G. Bronson, of Chicago, Ill. The side rail of the sash has a longitudinal slot in which are fixed slots inclining downward from the inside to the outside, and a screen is secured on the inside and outside of the rail to keep out the dust, mosquitoes, etc.

A shaft holder has been patented by Mr. Amandus Getzschmann, of Omaha, Neb. It is formed of a top leather part and a curved metal rod held thereon, a series of anti-friction rollers or thimbles being mounted on the rod, the object being to prevent binding of the shafts and wear of the holder.

A portable hay and grain cover has been patented by Mr. John M. Sweeney, of Monmouth, Ill. It consists of a series of boards having fastenings on their inner faces, with an eye at one end and a hook on the other, with which a roof-like cover can be quickly made and readily taken off when not required.

A fire proofing and wood preserving compound has been patented by Mr. William H. Polleys, of Melrose, Wis. It is composed of borax, potash, alum, mica cut in muriatic acid, glue, salt, and water, mixed in stated proportions, and applied to different articles of wood after a specified manner.

A fence post has been patented by Mr. Benjamin Wheeler, Jr., of Zanesville, O. It is made of artificial stone in a continuous piece, with a wooden core, transverse grooves for fence wires, and a mortise for the abutting ends of fence rails, one wall of the mortise communicating with the wooden core.

A washboard has been patented by Mr. Ephraim Bailey, of West Newbury, Mass. This invention relates to a novel construction and arrangement of sectional and many sided rollers in a washboard, in the manner of supporting them centrally, and in alternating them with each other, so they will revolve more easily and lessen the labor of washing.

A sand arrester for driven wells has been patented by Mr. Charles W. Huffman, of Richwood, Ohio. It is placed just below the pump, and consists of an outer inclosing tube within which there projects a continuation of the well pipe, in combination with a screen detachably connected with the outer inclosing tube.

A coat has been patented by Mr. Wilson A. Fulmer, of Harleysville, Pa. It is provided with stiffening layers of canvas and hair cloth and a stay at the lapel, the arrangement of the whole being such as to help make the coat fit well and remain in proper position and shape on the breast without being buttoned.

A door check has been patented by Mr. Joseph A. Coultaus, of Brooklyn, N. Y. The device has a spring in combination with the door frame or casing, and a corrugated fixed track with spring roller carrier and attached roller, the whole intended to hold doors more or less open and prevent them from slamming when closing.

A razor has been patented by Mr. Samuel J. Dyer, of Brooklyn, N. Y. This invention covers a construction of blade and blade holder, with ordinary handle, whereby the blade can be honed with a double bevel on its edge, and the blade can be perfectly adjusted to give absolute width and angle to be affected by the honing.

A neck yoke strap has been patented by Mr. George H. Lynds, of Sterling, Kan. It has a fastening composed of a layer of wire extending around the neck yoke and pole openings, the metal concealed within the body of the strap, but so placed as to give greatly increased strength when the wear is great and breakage often happens.

A life preserver has been patented by Mr. Paul Kingston, of Hastings, Minn. It is made of waterproof flexible fabric, on a frame, to the ends of which a bow and stern bar are hinged, and has inflatable sacks connected together and with an air pump, the device being one which can be folded compactly and capable of being converted into a boat.

A gate has been patented by Mr. James H. Carpenter, of Hyndman, Pa. It has balancing arms so pivoted that the gate may be easily operated, with other novel features, its construction being such that it is well adapted for use on side hills and other localities where a horizontally swinging gate cannot be employed.

A dumping cart has been patented by Mr. Thomas Hill, of Jersey City, N. J. The tail board has combined with the axle or frame radius rods, or pivoted connections, whereby, on raising the front or tipping the rear end of the body, the tail board will be automatically opened, and will be closed and held closed on returning the box to its nominal position.

A machine for filing gin saws has been patented by Messrs. James S. Mosley and Thomas J. Mancill, of Atlanta, Miss. Combined with a frame and vertical plate are crank wheels and shaft to vibrate the file holders, while the pitman may have a longer or shorter stroke, and the machine can be adjusted for filing gin saws with teeth of different sizes.

A folding bed has been patented by Mr. Ernst N. Doring, of New York city. Combined with stationary and movable sides are curved tracks and pivot wheels, of novel construction, which operate so that the pivoting points of the movable sides will adjust themselves as the bed is being opened and folded.

A sidewalk clearer has been patented by Mr. Charles E. Bartram, of Fredonia, N. Y. It is made with a base frame widened toward its forward end, with a bottom, flanges at its sides and rear, a handle, and carried by wheels and an axle, the device being adapted to facilitate the removal of snow and ice from sidewalks.

A process of preserving brewers' grains has been patented by Mr. William Ihne, of Medford, Wis. It consists in first draining, then treating the grains successively with a solution of common salt, a solution of dextrine, and a solution of permanganate of potassa, and afterward filtering and subjecting to pressure to form compact cakes of convenient size.

A pipe holder and lifter has been patented by Mr. E. Stillman Babcock, of Milton, Wis. Combined with a jaw block is a pivoted clamping lever, an eccentric pivoted therein, and a lever for raising or lifting the pipe, the device being more especially adapted for raising pipes from artesian, oil, and other wells, and lowering the same.

A churn has been patented by Mr. George J. Clark, of Ayersville, O. The churning device is held on the cover, and can be easily removed with it to clean the cream box, while the construction is such that by turning a craft rocking shafts are operated, and dasher plates thereon alternately raised and lowered in opposite directions.

A washing machine has been patented by Mr. John B. Richardson, of Pleasant Plains, Ill. It is a covered tub with interior projecting ribs, a clothes wheel journaled in the tub carrying peripheral bars or slats, provided on their outer faces with cords for holding the clothes to the wheel, springs being arranged to prevent tearing strains on the clothes by the tie cords.

A slate pencil sharpener has been patented by Hattie Scott, of Detroit, Mich. Combined with an abrading disk, and gearing for revolving it, is a support adjacent to the disk, with a curved line and a number of notches for receiving the pencils, the lower part of the grindstone dipping into water and preventing the slate dust from spreading.

A washing machine has been patented by Mr. William T. Venable, or Christiansburg Precinct, Ky. In a suitable tub or box is a circularly reciprocating disk, operated by crank handles, and from this disk wooden or metal pins project downward, the pins whirling the clothes about and agitating the water, with other novel features.

A pistol for shooting marbles has been patented by Mr. James W. Smith, of Jersey City, N. J. A coil spring held in a pocket on the under side of the barrel is connected with a rod in the barrel, and the trigger, in such way that by pulling the latter the rear head of the rod is disengaged, and very forcibly ejects the ball.

A cut-off table for tile machines has been patented by Mr. Charles W. Crawford, of Brazil, Ind. It consists of a series of rollers in a horizontal adjustable frame, with two rows of rollers attached to inclined frames, adapted to advance or recede relatively as desired, the table facilitating the carrying off of tiles, guiding them laterally and supporting them to prevent flattening and chafing.

Photographic sensitive paper forms the subject of a patent issued to Mr. Thomas C. Roche, of Brooklyn, N. Y. It is made with the body of the paper inclosed between two sensitive films of gelatine silver emulsion, all carried on a single sheet of paper, to be used in the camera for the production of negatives or in printing frames for positive pictures, in the usual manner.

A self-adjusting chain sling has been patented by Mr. William Smith, of Brooklyn, N. Y. It consists of a number of chains united to an upper link or ring, each chain carrying a link or ring at its lower end, and each chain passing through the link carried by the adjacent chain upon one side, the device being more especially for grappling submarine, but also applicable for hoisting heavy goods.

A wax heater for sewing machines has been patented by Mr. Benjamin F. Landis, of St. Joseph, Mo. The wax reservoir is hung lower than the bottom of the shuttle race, with a water boiler and combustion chamber beneath, and the arrangement is such that the heated air is moistened to have a mellow action on the thread, while establishing a current in the proper direction.

A water closet has been patented by Mr. Philip Brady, of New York city. The bowl of the soil pipe has a valve chamber just below the bowl, and a pipe connected therewith extends upward to a point below the top of the bowl and then down, while connected with the soil pipe below the valve chamber is a valve and ventilating pipe connected with an overflow pipe, so that the overflow can be used on baths, basins, etc., as well as on water closet bowls.

Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Wanted.—An ingenious machinist, capable of setting up and adjusting light and intricate machinery. Address, with references, P. O. box 2141, New York city.

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Hercules Lacing and Superior Leather Belting made by Page Belting Co., Concord, N. H. See adv. page 270.

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The Knowles Steam Pump Works, 44 Washington St., Boston, and 93 Liberty St., New York, have just issued a new catalogue, in which are many new and improved forms of Pumping Machinery of the single and duplex, steam and power type. This catalogue will be mailed free of charge on application.

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Wanted.—A man competent to manage the introduction and sale of light machinery. Must be a good business man. Address, with references, P. O. box 2141, New York city.

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If an invention has not been patented in the United States for more than one year, it may still be patented in Canada. Cost for Canadian patent, $40. Various other foreign patents may also be obtained. For instructions address Munn & Co., SCIENTIFIC AMERICAN patent agency, 361 Broadway, New York.

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Wood Working Machinery. Full line. Williamsport Machine Co., "Limited," 110 W. 3d St., Williamsport, Pa.

Keystone Steam Driller for all kinds of artesian wells. Keystone Driller Co., Limited, Box 32, Fallston, Pa.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 46.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

Send for descriptive circular on lubrication. Charles H. Beasly & Co., North American Agents for Reisert's Celebrated Solid Oil, 175 & 177 Lake St., Chicago, Ill.

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Emerson's ☞ *Book of Saws free. Reduced prices for* 1885. 50,000 Sawyers and Lumbermen. Address Emerson, Smith & Co., Limited, Beaver Falls, Pa.

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"How to Keep Boilers Clean." Send your address for free 88 page book. Jas. C. Hotchkiss, 86 John St., N. Y.

Barrel, Keg, Hogshead, Stave Mach'y. See adv. p. 76.

Planing and Matching Machines. All kinds Wood Working Machinery. C. B. Rogers & Co., Norwich, Conn.

"Wrinkles in Electric Lighting," by V. Stephen; with illustrations. Price, $1.00. E. & F. N. Spon, New York.

Patent Elevators with Automatic Hatch Covers. Circular free. Tubbs & Humphrey, Cohoes, N. Y.

Iron and Steel Wire, Wire Rope, Wire Rope Tramways. Trenton Iron Company, Trenton, N. J.

Brands cut in Wood, Pattern and Brand Letters. Vanderburgh, Wells & Co., 110 Fulton St., New York.

Brass and Iron Working Machinery, Die Sinkers, and Screw Machines. Warner & Swasey, Cleveland, O.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.
References to former articles or answers should give date of paper and page or number of question.
Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.
Special Information requests on matters of personal rather than general interest, and requests for **Prompt Answers by Letter,** should be accompanied with remittance of $1 to $5, according to the subject, as we cannot be expected to perform such service without remuneration.
Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Minerals sent for examination should be distinctly marked or labeled.

(1) G. A. asks the best and quickest way to dip brass and dry it after rinsing, so as to retain its bright color. A. Wash in hot soap suds with a soft brush, rinse in clean hot water, and dry in sawdust. Boxwood sawdust is best. Beach, maple, or white pine will do.

(2) E. R. S. asks: In a solid brick wall is there any more weight upon one brick than another? A. Not at the same height.

(3) J. M. B. asks what the coating used on soil pipe is composed of, and the process of putting it on. A. Coal tar, heated in an iron vat of suitable size for dipping the pipe, which is warmed to make it dry, and dipped and drained hot.

(4) C. S. writes: I heard it stated by a scientific engineer that if the scientific principles of mechanics were carried out in constructing a locomotive, it would not run. A. The scientific engineer was probably a scientific crank, or he would have explained the meaning of his assertion.

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(5) A. I. I. writes: We laid a common black gas pipe under the railroad where the track had been ballasted with slack coal, and within four weeks' time the pipe was full of holes eaten from the outside. What was it that caused it? Was it the water and leachings off of the coal standing in the trench? A. The coal slack contains sulphur, which soon eats through iron pipe. Lead pipe will be better, and last much longer if it is necessary to lay it in the coal slack or where the water from coal slack may come in contact with it.

(6) B. A. C.—New plated work, if not burnished, requires buffing with felt buff and rotten stone. Then brush or buff with a soft felt and rouge. This is not as good as burnishing, as the burnisher hardens the surface.

(7) T. W. writes: I wish to know if malleable iron is welded together or can be welded to wrought iron? A. Malleable iron may be welded to iron and low steel, as you may see by examining malleable shears with steel faces. Use borax melted with 10 per cent of salammoniac for a flux. Mix and cool, then powder, and use in the same manner as borax powder.

(8) J. H. V. and M. P. L.—For etching brands and marks on polished steel surfaces, such as saws, knife blades, and tools, where there are many pieces to be done alike, procure a rubber stamp with the required design made so that the letters and figure that are to be bitten by the acid shall be depressed in the stamp. Have a plain border around the design, large enough to allow a little border of common putty to be laid around the edge of the stamped design to receive the acid. For ink, use resin, lard, oil, turpentine, and lampblack. To ¼ pound of resin put 1 teaspoonful lard oil; melt, and stir in a tablespoonful of lampblack; thoroughly mix, and add enough turpentine to make it of the consistency of printer's ink when cold. Use this on the stamp in the same manner as when stamping with ink. When the plate is stamped, place a little border of common putty around and on the edge of the stamped ground. Then pour within the border enough acid mixture to cover the figure, and let it stand a few moments, according to the depth required, then pour the acid off. Rinse the surface with clean water; take off the putty border, and clean off the ink with turpentine. Use care not to spill the acid over the polished part of the article. For the acid, 1 part nitric acid, 1 part hydrochloric acid, to 10 parts water by measure. If the effervescence seems too active, add more water.

(9) M. & P. write: We have in contemplation the erection of a grist mill. The location necessitates a subterranean passage of water to the mill or a deep cut water way. Wood as a support of the earth would soon rot. We know where we can purchase two engine boilers second hand, and want to know how long they would probably last in such a position. A. We could not venture to give more than a general opinion. If the iron is ¼ inch thick all over, and well painted with coal tar outside and inside when laid, it might last a good many years.

(10) F. H. asks: Which of the following materials is the best for deafening for a skating rink located upstairs: Mortar, cement, asbestos felt, other felt, wool (prepared?) sawdust, and gravel? A. Mortar and cement are not used for deafening on the top of the floor on which the skating floor is laid. It is too hard, and is good only as a plaster between the beams in the usual way. Asbestos and wool are very expensive, but good. Common roofing felt laid upon the original floor, and covered with a mixture of about equal parts of fine clean sand and sawdust about 1 inch thick, upon which lay furring strips and skating floor, makes the best insulator that we can suggest.

(11) J. F. W. asks how long a box holding gasoline, made of wood, covered with No. 16 zinc, buried 8 feet underground, would last, and whether it would last longer than galvanized iron? A. The wood in the box would last many years. The zinc would corrode on the outside only, and if as thick as No. 18 or 20 wire gauge, should last five years in a favorable soil. There is a great difference in soils as to their oxidizing effects. The zinc should last longer than the galvanized iron.

(12) L. H.—If your "red nose" is caused by dram drinking, nothing but abstinence therefrom will remedy the evil. If it comes from any other curable cause, you had better consult a physician.

(13) G. B.—The article on "Beer Stronger than Whiskey," which has been going the rounds of the papers lately, credited to the SCIENTIFIC AMERICAN, was copied by us several years ago from the *Inebriates' Journal*, and published as a clipping from that periodical.

(14) S. M. S.—The difference between charcoal and coke tin only shows in working; charcoal tin is the toughest. The best tin for roofing is called tern plate or roofing tin. It is covered with an alloy of tin and lead.

(15) H. W. P. sends a plant for identification. A. It is the milk thistle (*Carduus Marianus*). It has no remedial qualities. Its use as a remedy for snake bite was probably suggested by the variegated leaves, the ancient "doctrine of signatures" being still believed in by the ignorant.

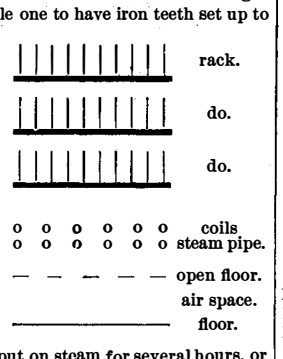
(16) W. P. L. asks whether lead lining is injurious to brass, silver, or gold solutions; if so, what is best for lining tanks? A. Lead is not good. Glass, asphaltum, or paraffine is good. A wooden tank covered on inside with paraffine, by melting and spreading over the surface of the wood with a hot iron, is cheap and quickly done.

(17) H. B. writes: In the barometer described in SCIENTIFIC AMERICAN of August 22, does the compressed air force the liquid to the top of the tube in changing weather, or what causes it? A. Variations in atmospheric pressure act upon the surface of the liquid in a barometer tube; increased pressure sending the liquid down (in the open end), and *vice versa*. Variation in temperature also varies the column. Heat makes the column rise, and cold makes it fall, the compressed air in the bottle keeping the liquid column at its normal height; the bottle being sealed airtight.

(18) S. A. C.—There is no evidence, to our knowledge, of the use of iron by the early inhabitants of Central America; nor is there any evidence that it was not used, as iron utensils or tools might lose their identity by oxidation and absorption in the period which has since elapsed.

(19) T. H. De L. writes: We are using as fuel in boiler furnaces (return tubular) Georgia pine and bituminous coal, first throwing in a "fire" of the wood and then from ten to fifteen shovelfuls of the coal. Is there any objection to this, looking at it from an economic (or any other) point of view? A. Not knowing the value of Georgia pine wood and Cumberland coal in your place, we cannot estimate their relative economy as fuel. It seems to us rather strange and eccentric to fire boilers in the manner you describe. Both of the materials of combustion being of a soot producing nature, we should judge that the flues would foul very rapidly. An engineer that understands firing with Cumberland coal alone so manages the fire as produce the least amount of unconsumed carbon in the escaping products of combustion. We cannot see any advantage in using wood and coal alternately. It seems impossible to keep a bright back fire for consuming the smoke.

(20) C. H. S. writes: I wish to construct a kiln drier, of about 7,000 superficial feet capacity, in connection with my steam saw mill—steam capacity, 90 H. P.—for drying hard and soft wood, taking it for granted the exhaust will afford sufficient heat for kiln when working. A. Build your drying room a little longer than the longest lumber to be dried; make it 8 ft. high, and about 7 ft. wide for a thousand feet of boards, or about 800 cubic feet capacity. Such a room with exhaust steam will require a coil of 1 in. pipe, two pipes high, 3 inches center to center of pipes, to cover the entire floor—say 750 ft. of 1 in. pipe. The headers into which the 1 in. pipes connect should be, for above coil, made of 4 in. pipe drilled and tapped. The connecting pipe should be 2½ in., or proportional for larger coils. So arrange outlets as to drip all the water and give free vent to steam; you will need not more than ½ pound back pressure on engine; if well planned, much less. A gate valve in the exhaust connection with a live steam inlet to coil ¾ in. will enable you to keep steam in coil when engine is not running. The floor boards of room should be narrow, and laid with ½ in. openings between the boards, and a space below floor that can be closed or opened to control the ventilation. There should also be several openings at top of room, with dampers. The best way to pile the lumber for effective and uniform drying is to place it on edge in racks, as in the room above indicated, three racks high, of hard wood scantling, and for boards three racks in the length of the room, the middle one to have iron teeth set up to keep the boards on edge, as shown herewith. The greatest trouble arises in many drying rooms from the piling of the lumber too close, which obstructs circulation of air among the pieces, and hence no drying. The operation should be as follows: After filling the room with lumber *close it tight;* put on steam for several hours, or until the lumber becomes heated through, then ventilate slowly to carry off the moisture. This saves much cracking by surface drying.



(21) C. R. C. asks: Will you please inform me through the SCIENTIFIC AMERICAN how large a surface I will need, to attach a ground wire to, for a telegraph line about half a mile in length, also how deep it will need to be buried? A. A good ground plate should be made of copper, having a surface of about fifteen square feet. Larger would be better. This plate should be buried in earth that is constantly moist. Water and gas pipes form a good electrical ground.

(22) W. E. asks whether boards ever swell and shrink lengthwise, *i. e.*, with the grain, or not. A. The effect of moisture upon the length of boards is the reverse of its effect upon their width. That is, when the board is wet, it is shorter than when it is dry.

(23) C. D. D. asks: 1. Is the difference between a permanent magnet and an electro magnet, this: The former is magnetized at any and all times, and the latter only when acted upon by a current of electricity and demagnetized as soon as or soon after the current is broken? A. Yes. 2. Is the current of electricity, in an electric light machine caused by the revolving of the armature between the field magnets, or by the brushes in contact with the commutator? A. It is caused by the revolving of the armature. The brushes simply take off the current.

(24) E. A. C. writes: Where can I find working drawings and description of a small dynamo? Also of electric motor capable of running a small fan or toy boat? I wish the dynamo to give an electromotive force sufficient to light three Edison 6 candle power lamps. Thinking that you may have previous papers relating to them. A. You will find a full description of a small dynamo in SUPPLEMENT, No. 161. If you desire to run three six candle power lamps, you should make a dynamo of double the size given in the article referred to.

(25) H. W. asks: Do you know of a furnace that will volatilize gold, silver, etc., from the ore or from the metal? If so, will you kindly give me the name and address. A. The only furnace we know of that will volatilize gold and silver is the electric arc furnace, made by Siemens, of London.

(26) A. H. M. writes: I have been trying to make some permanent bar magnets by making a spool of No. 18 insulated copper wire 3 inches long, the wire being wound half an inch thick on spool and then placing the spool in circuit of an electric light dynamo, then passing a ⅜ inch by .6 inch round steel bar back and forth in the spool. I stop the spool on the center of the bar, and stop the dynamo before taking it out. This magnetizes the bar, but it is not very strong; is there any other method for making it stronger with the use of the dynamo? A. The trouble probably lies in your steel. Try ordinary machinery steel hardened only at the ends.

(27) B. F. T. asks: Will you please inform me what substance (cement or other) is used for sticking the emery to the "rifles" or hones used for sharpening scythes? A. A good quality of common glue.

(28) G. K. asks: What is needed for making nickel solution plate a good white color? My solution is plating a kind of cream color; my work is principally stove work. Also a receipt for making lime cake for buffing stove plates. A. Consult SUPPLEMENT, Nos. 152, 192, and 425, in which the subject of nickel plating is treated.

(29) J. W. M. asks: 1. Have you a good book on electricity for a beginner? One that explains the term used by electricians and others. A. Consult Ganot's Physics. Thompson's "Electricity and Magnetism" is a good book for beginners. 2. Do you know of any experiments tried by Mr. Wise, of St. Louis, in ballooning? It is said he has an airship (Chambers's Encyclopedia) in which he can cross the ocean in 48 hours. A. The experiment has not been tried, and considerable improvement in aerial navigation will be needed before it can be successfully accomplished.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted,

October 13, 1885,

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

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Alarm, G. M. Williams 328,166
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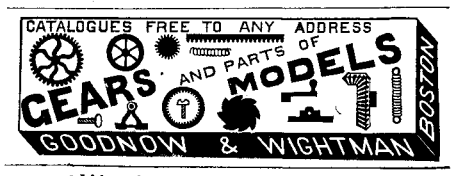

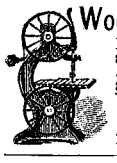
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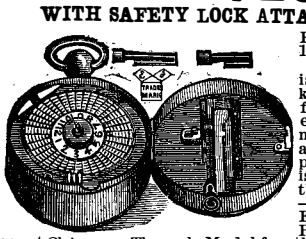
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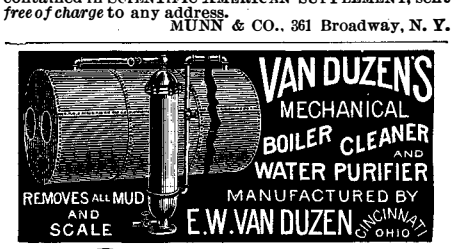

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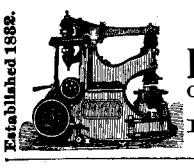

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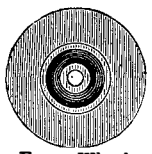
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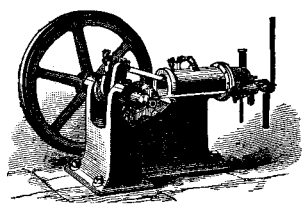

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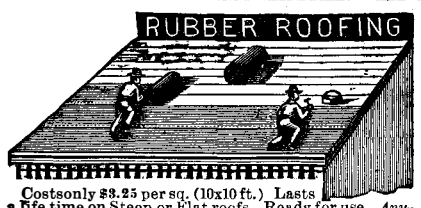

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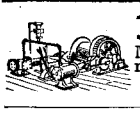

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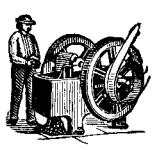

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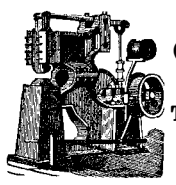

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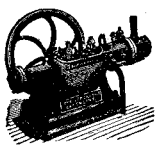

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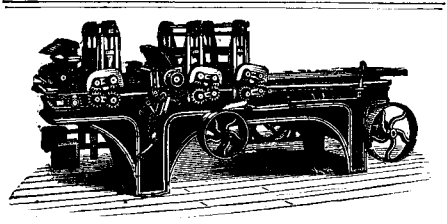

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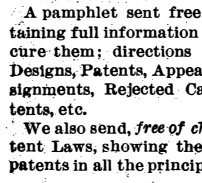

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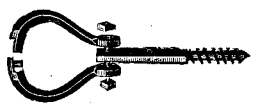

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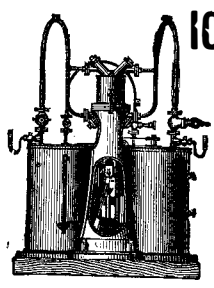

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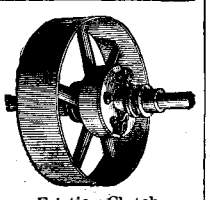
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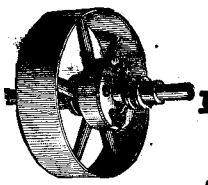
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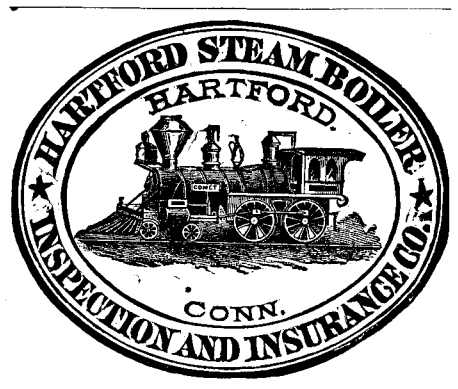

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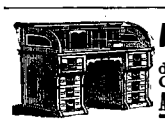

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